

APPENDIX A – SAMPLE RESOLUTION

The following resolution can be used by local jurisdictions to adopt the regional Hazard Mitigation Plan per FEMA requirements.

MODEL RESOLUTION ADOPTING A NATURAL HAZARDS MITIGATION PLAN FOR RICHMOND REGIONAL PLANNING DISTRICT COMMUNITIES:

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance, and

WHEREAS, a Mitigation Advisory Committee (“MAC”) comprised of representatives from Charles City, Goochland, Hanover, Henrico, New Kent, and Powhatan Counties and the City of Richmond was convened in order to study the (County’s name) risks from and vulnerabilities to natural hazards, and to make recommendations on mitigating the effects of such hazards on the (County name); and

WHEREAS, a request for proposals was issued to hire an experienced consulting firm to work with the MAC to develop a comprehensive natural hazard mitigation plan for the Richmond Regional Planning District; and

WHEREAS, the efforts of the MAC members and a consultant, in consultation with members of the public, private and non-profit sectors, have resulted in the development of a Hazard Mitigation Plan for the Richmond Regional Planning District including (County name).

NOW THEREFORE, BE IT RESOLVED by the (County Board of Supervisor’s name) that the Hazard Mitigation Plan dated () is hereby approved and adopted for the (County name). A copy of the plan is attached to this resolution.

ADOPTED by the (County) this ____ day of _____, 2005.

APPROVED:

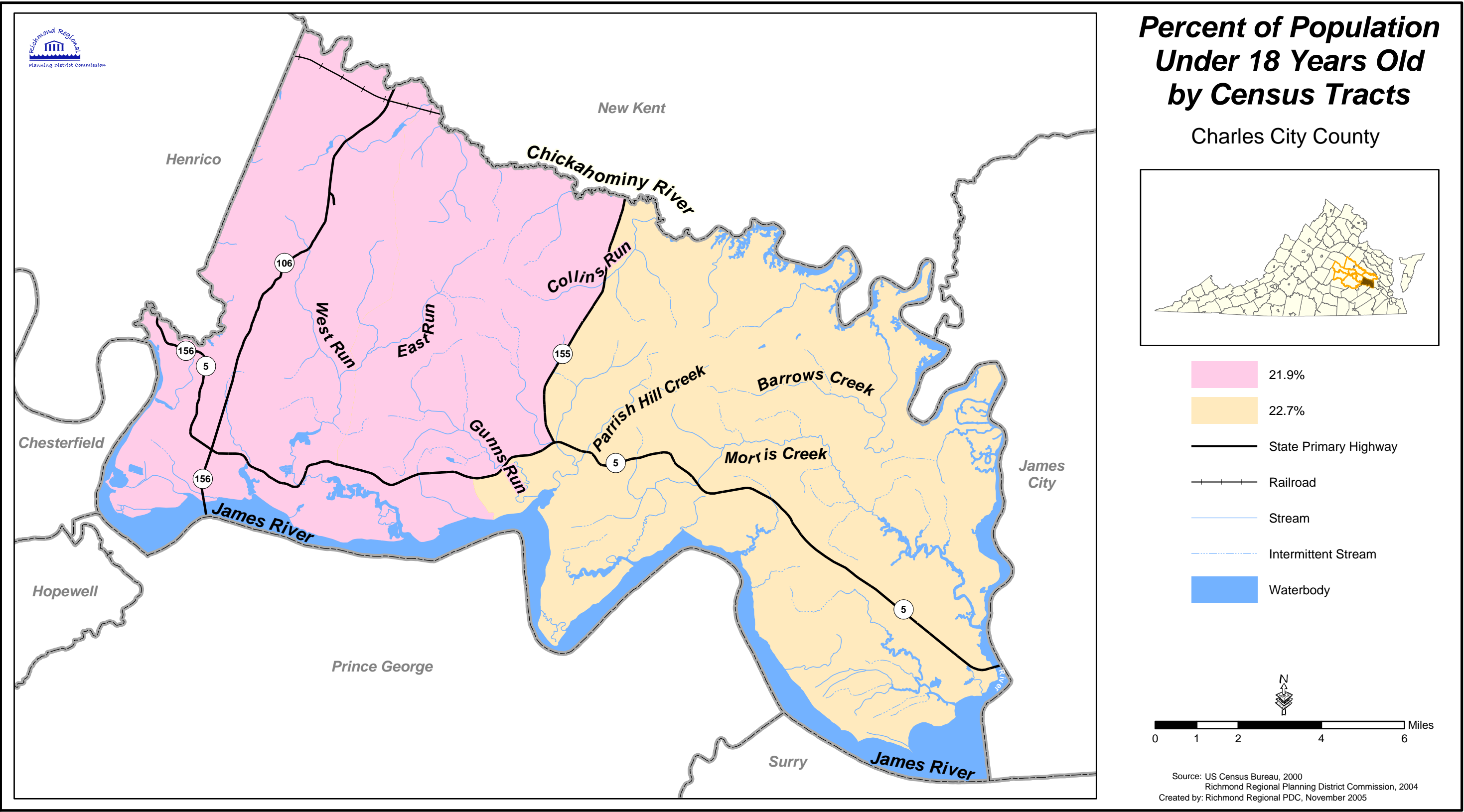
(Chairman, Board of Supervisors)

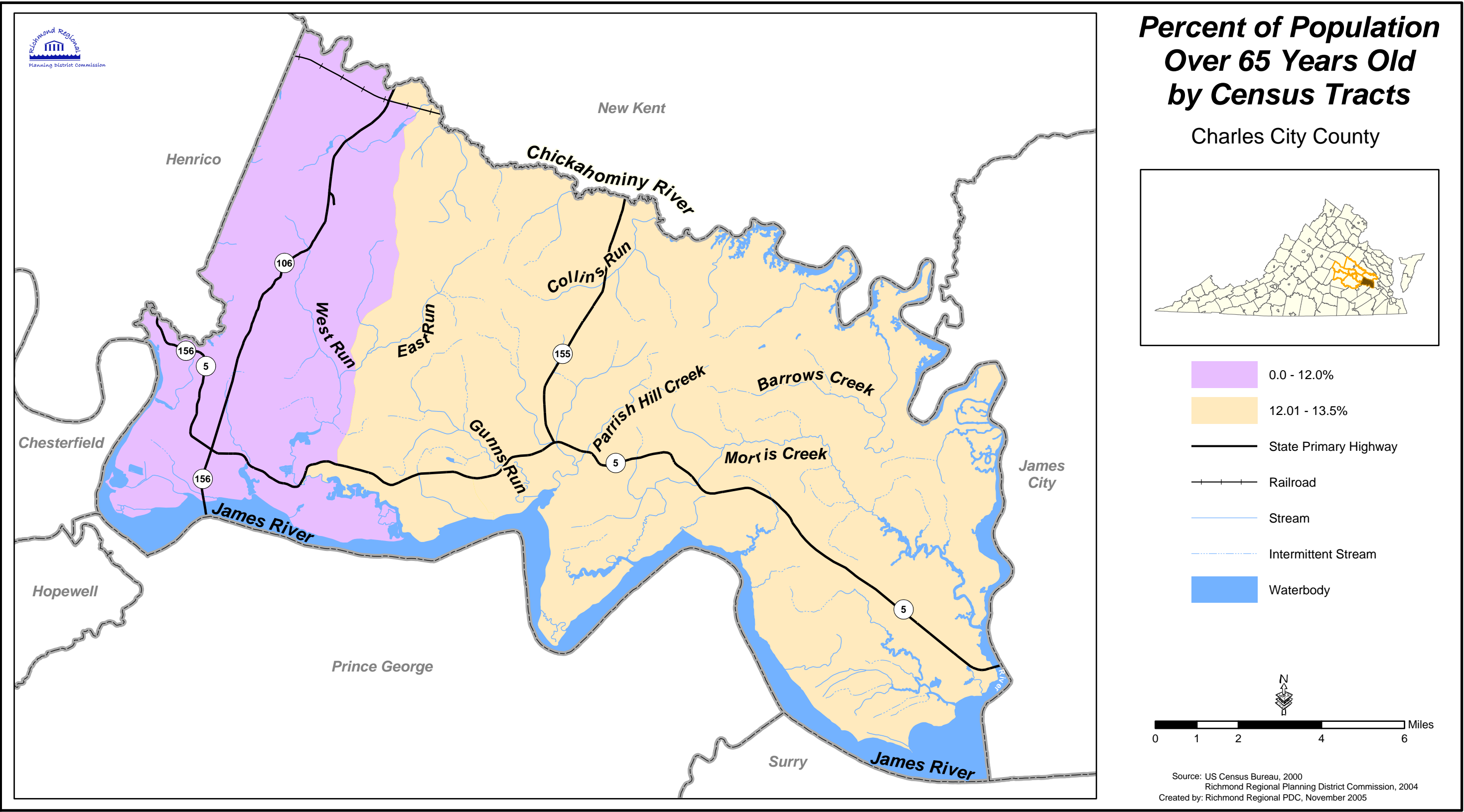
ATTEST:

(Clerk of the County)

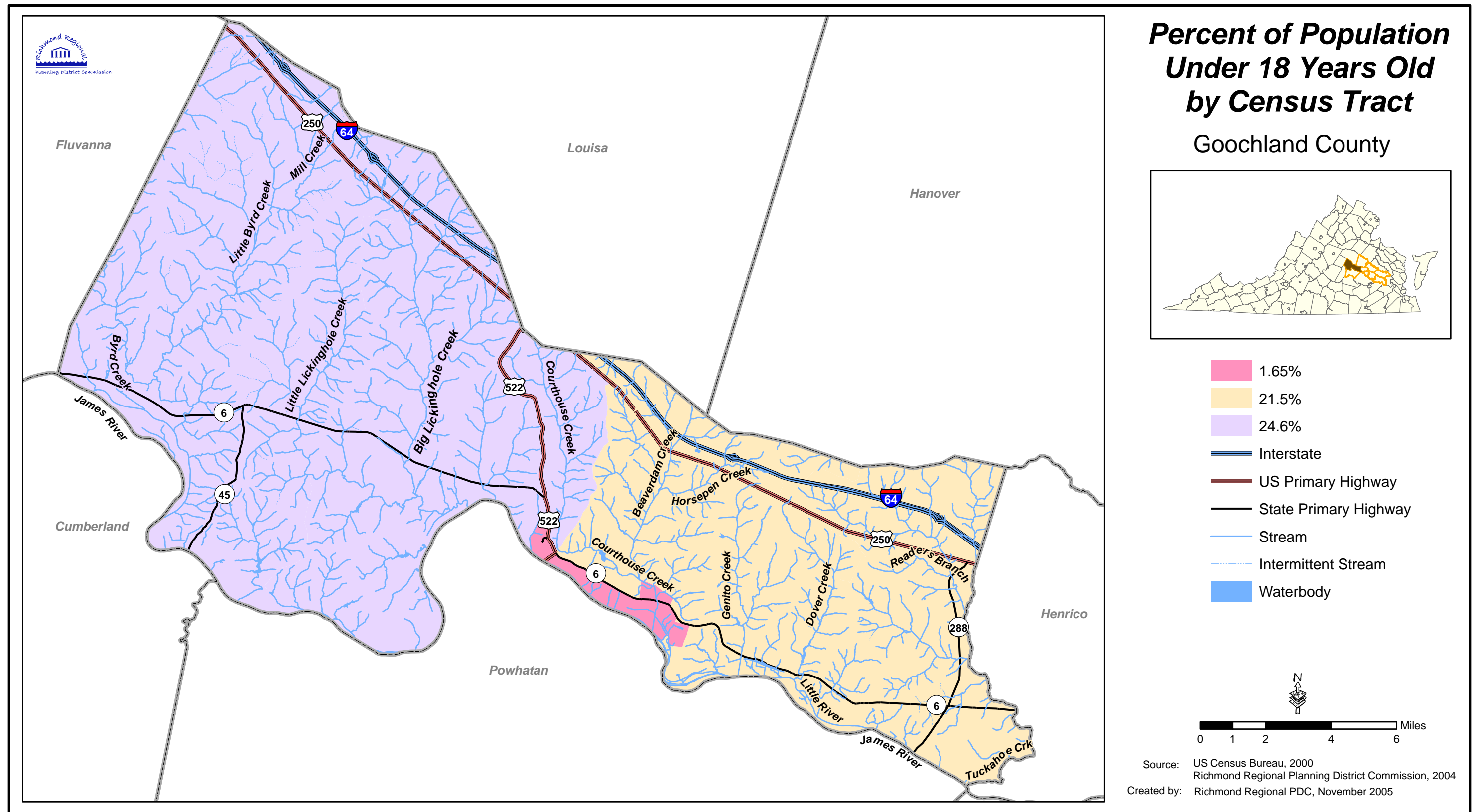
APPENDIX B – COMMUNITY PROFILE MAPS

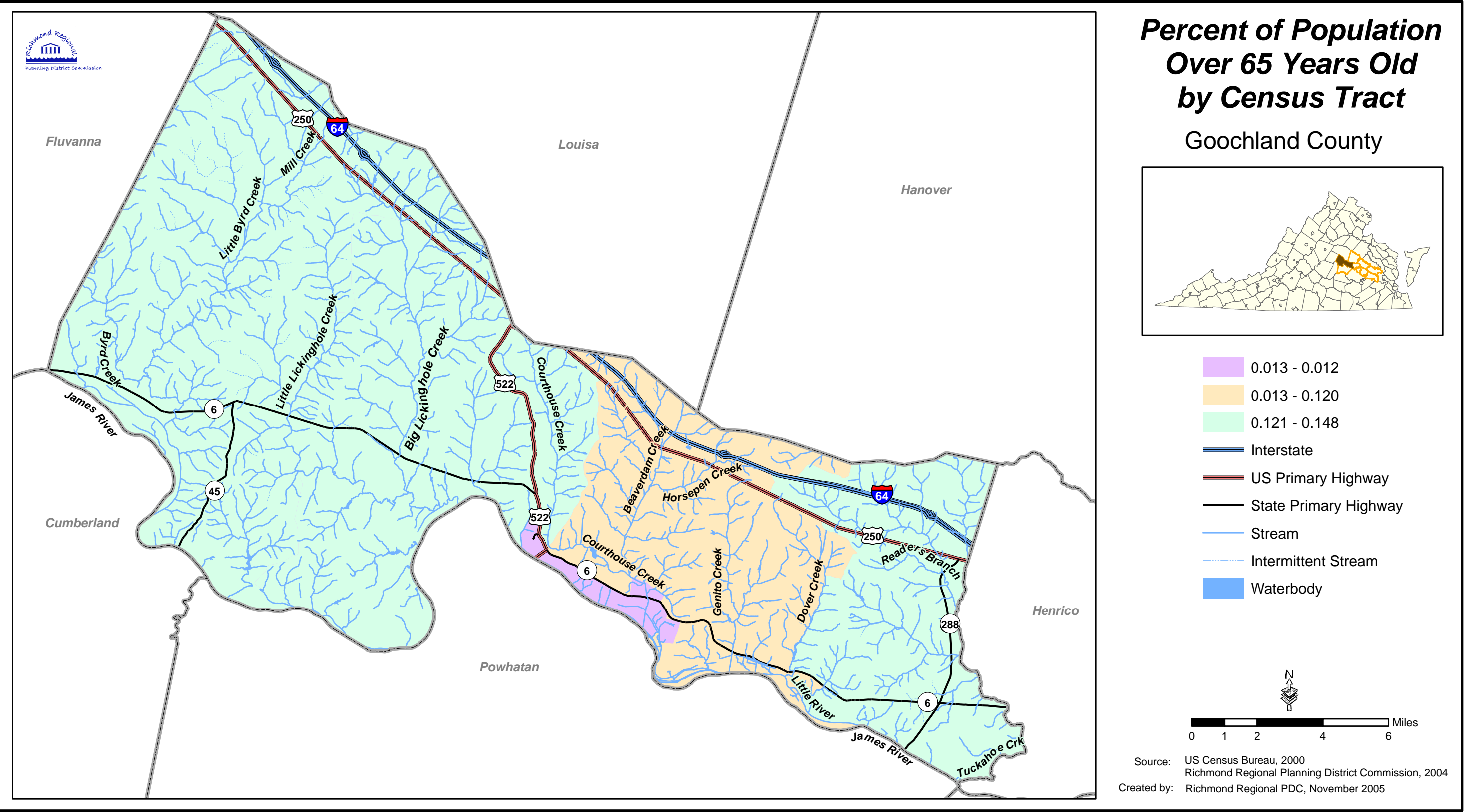
Age Distribution



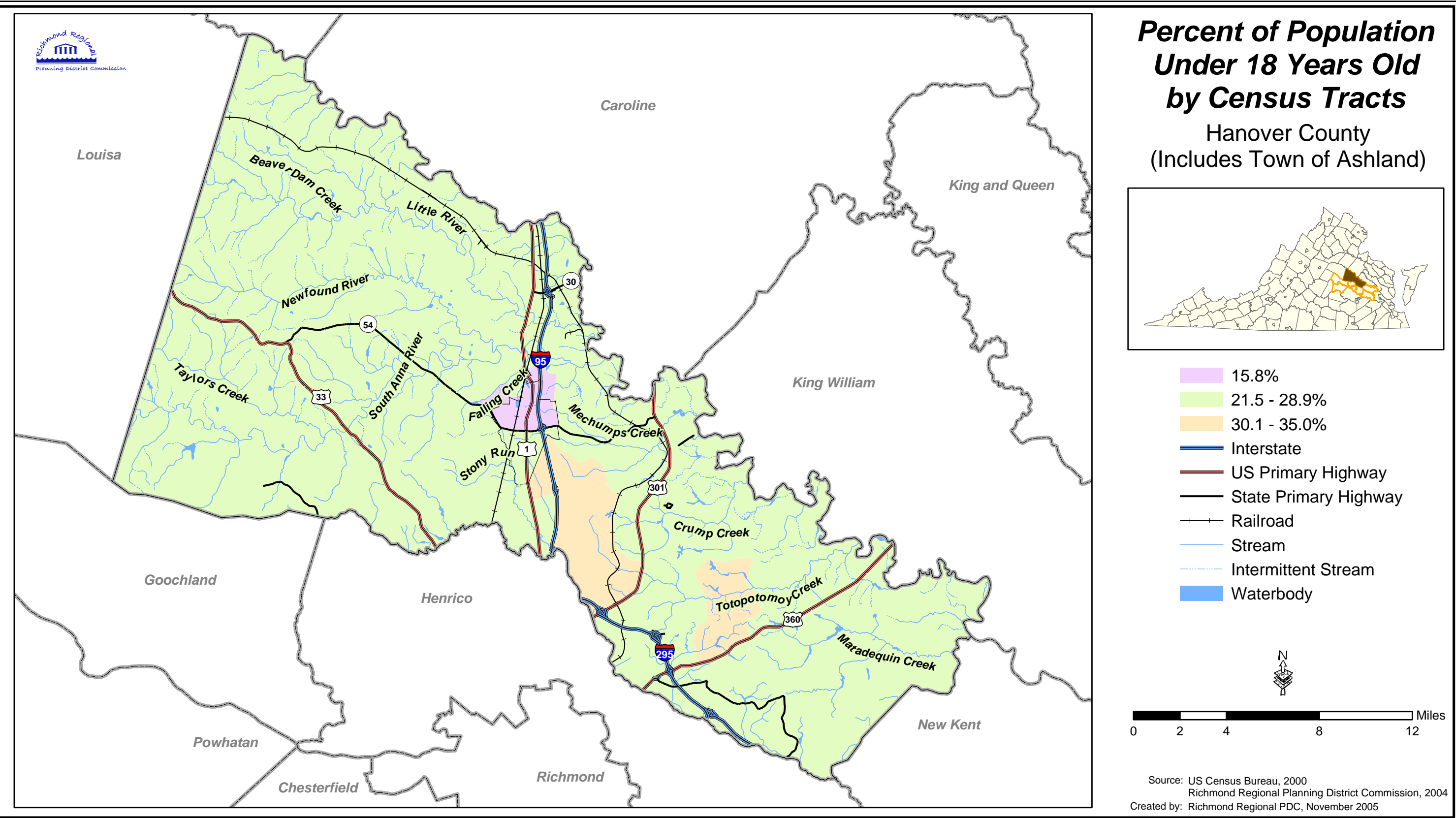


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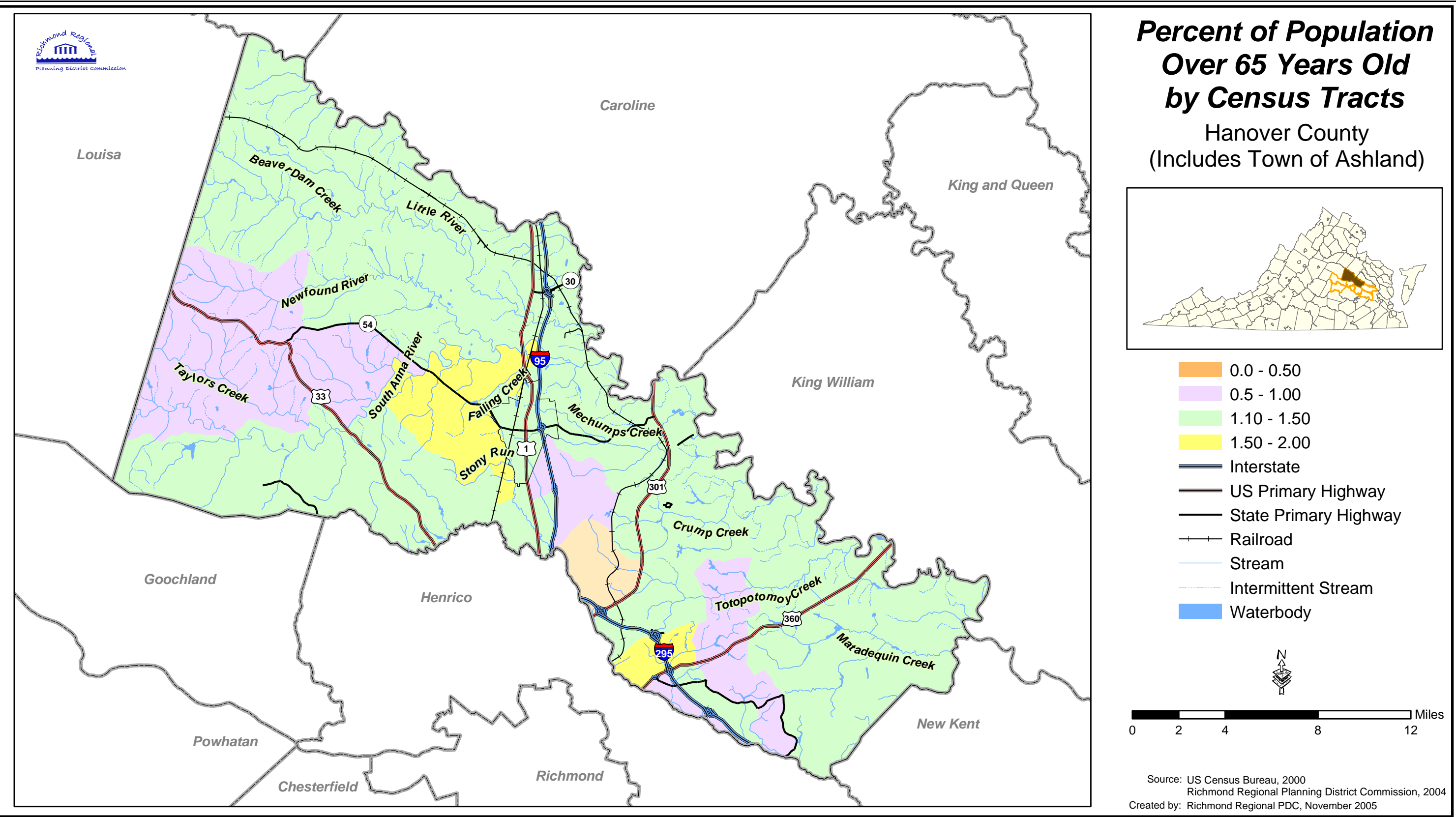


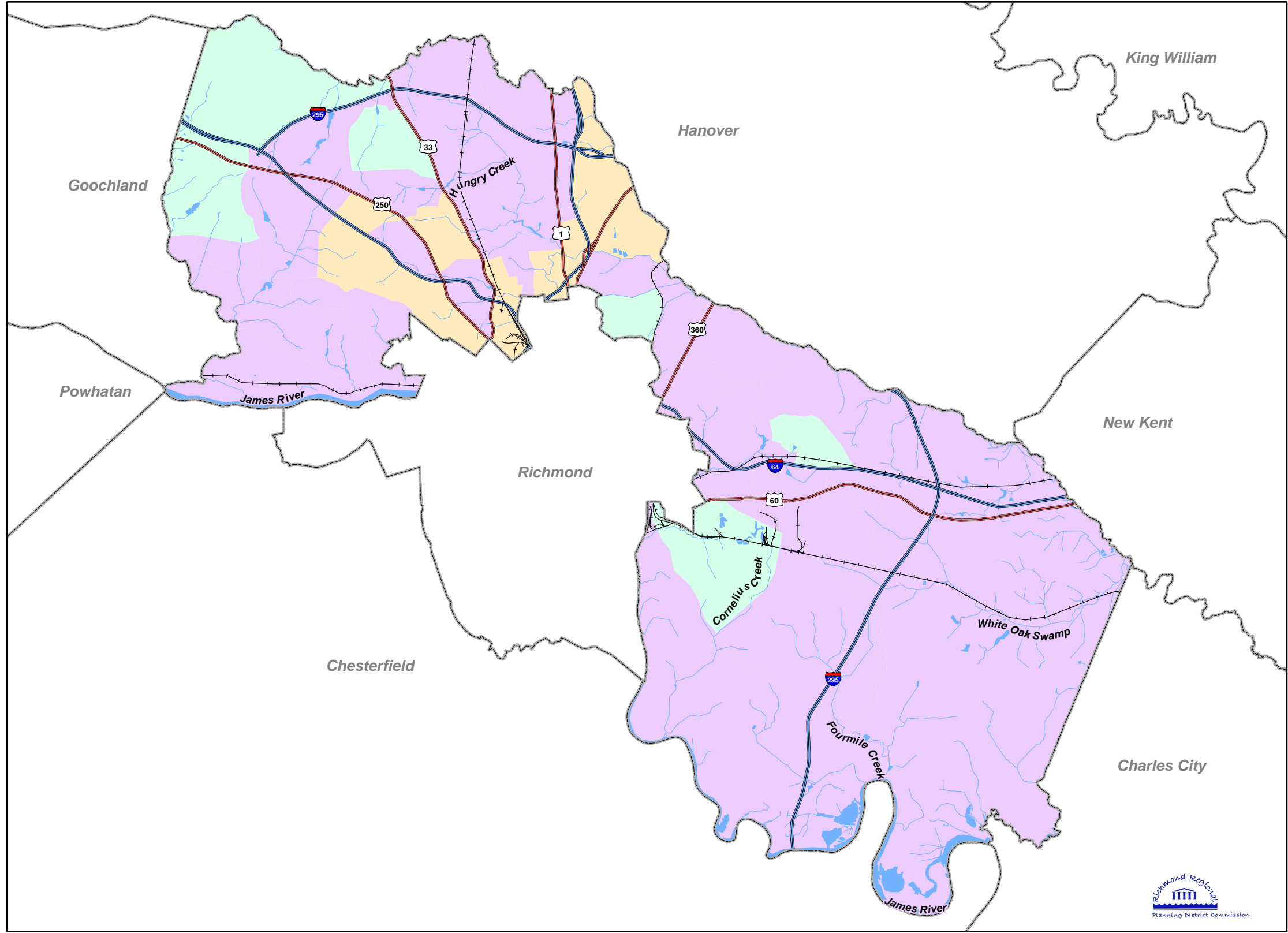


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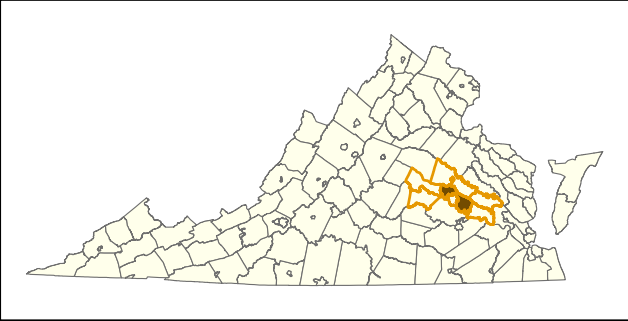
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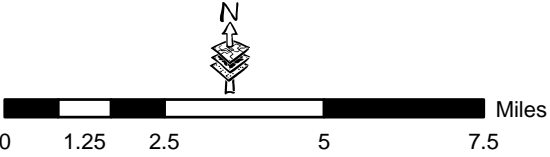


Percent of Population Under 18 Years Old by Census Tracts

Henrico County

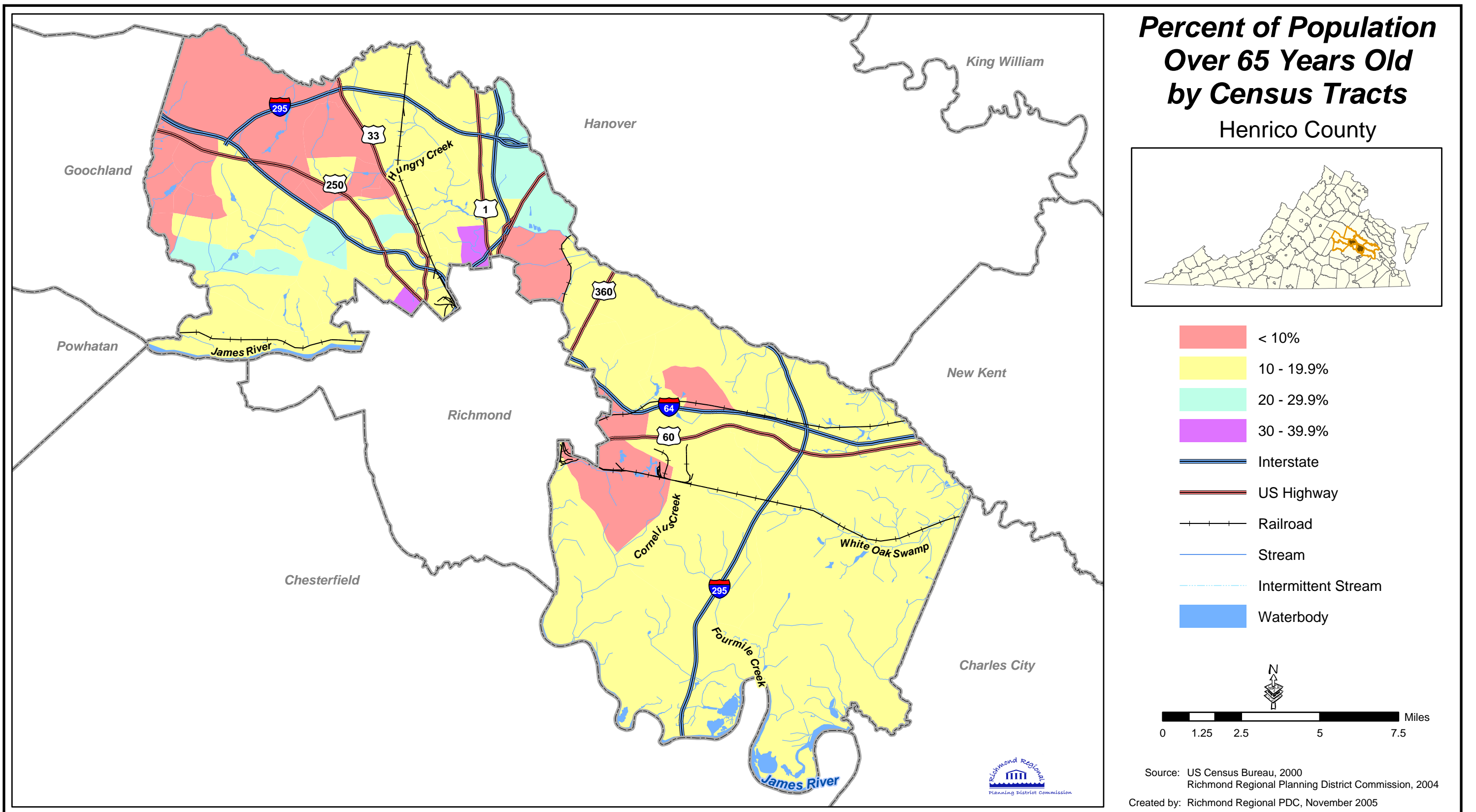


- 7.0 - 19.73%
- 20.2 - 29.9%
- 30.0 - 37.6%
- Interstate
- US Highway
- Railroad
- Stream
- Intermittent Stream
- Waterbody

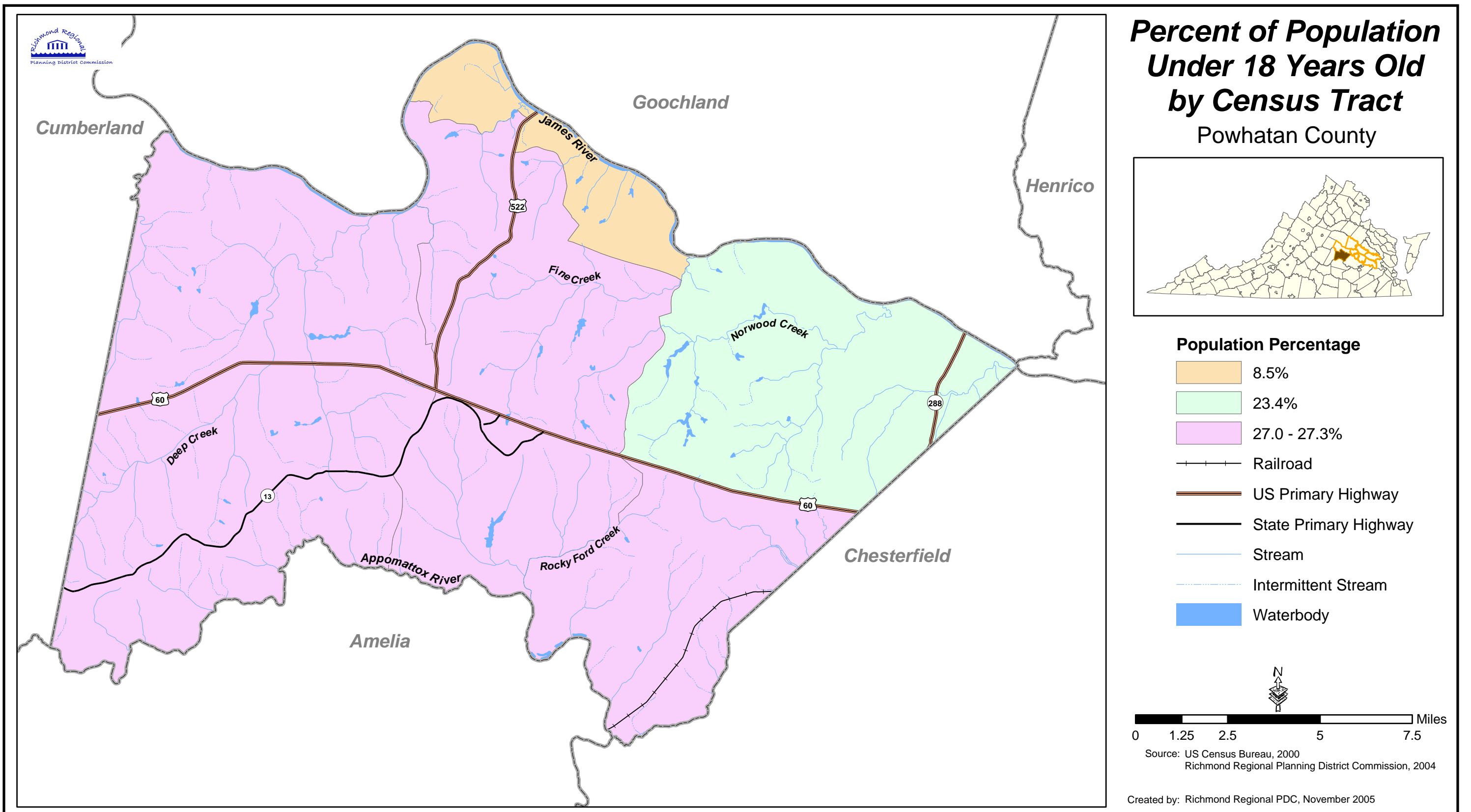


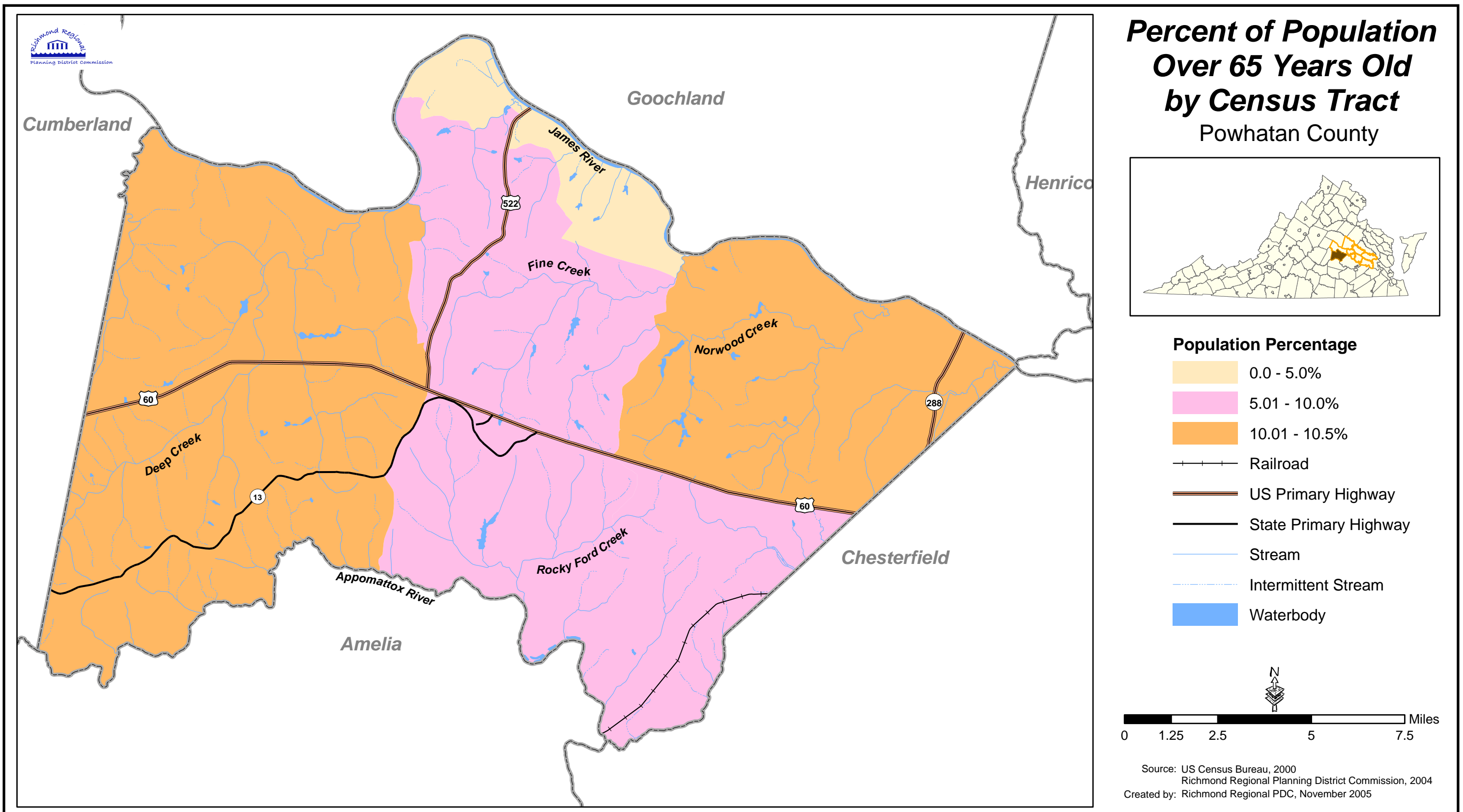
Source: US Census Bureau, 2000
Richmond Regional Planning District Commission, 2004
Created by: Richmond Regional PDC, November 2005

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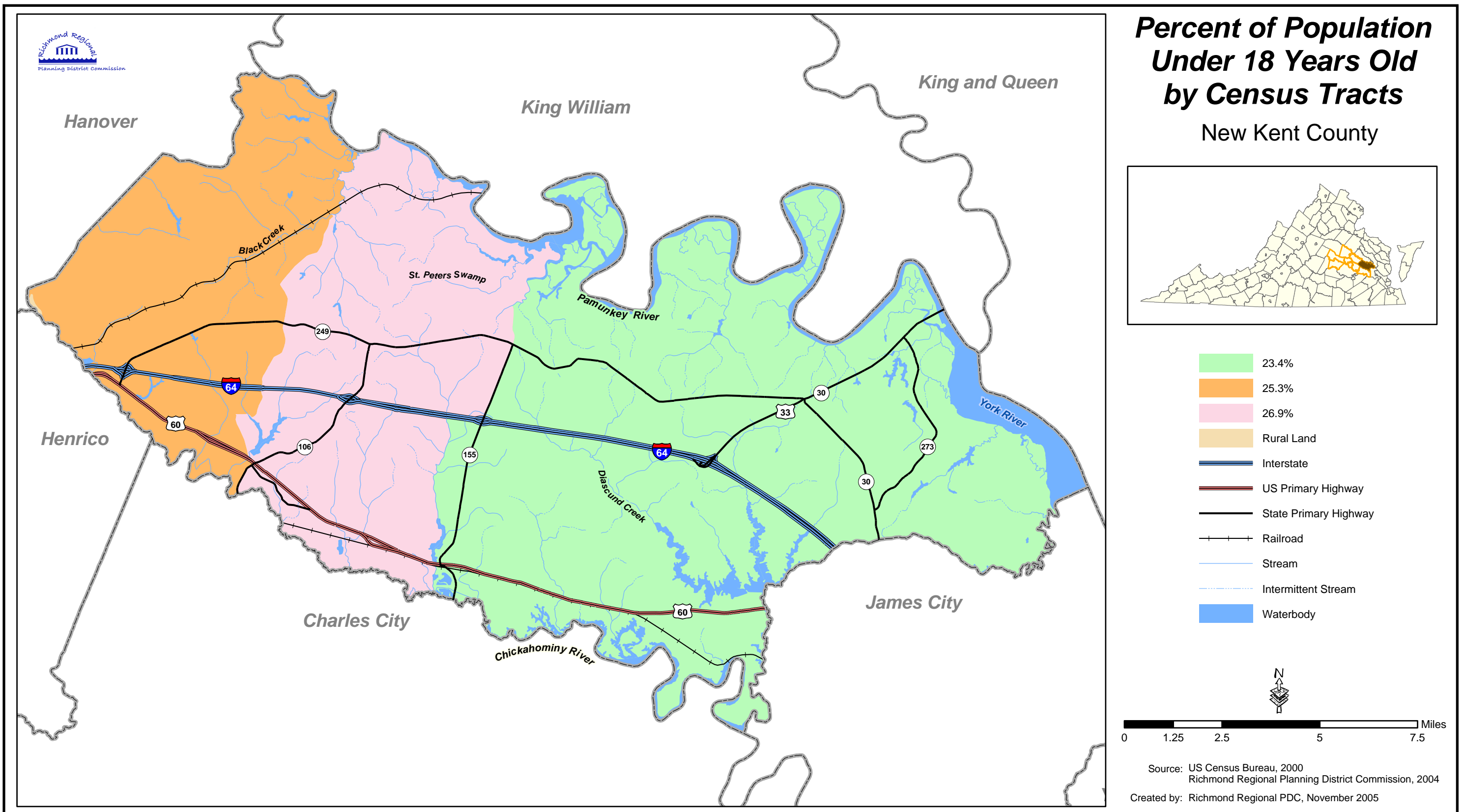


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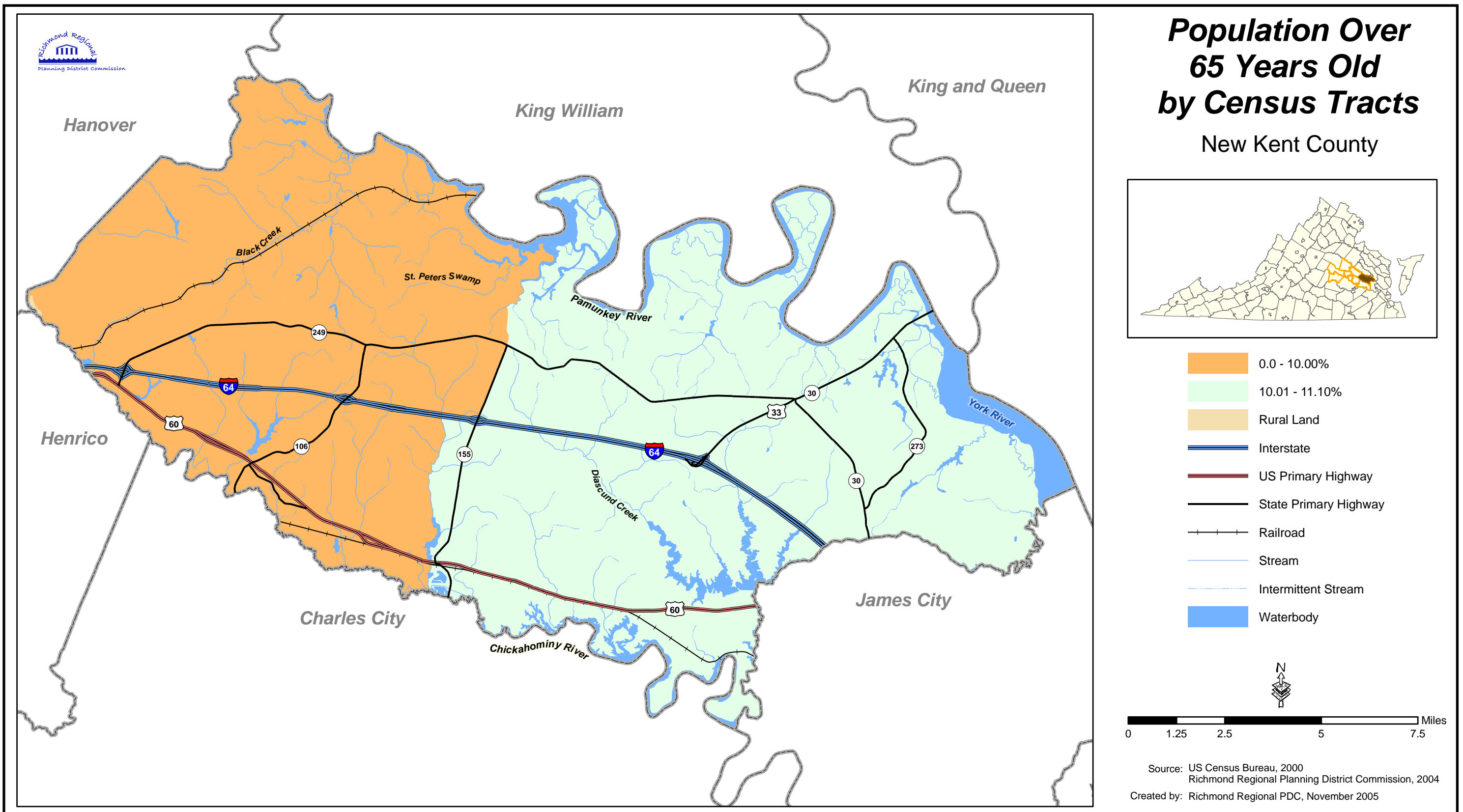




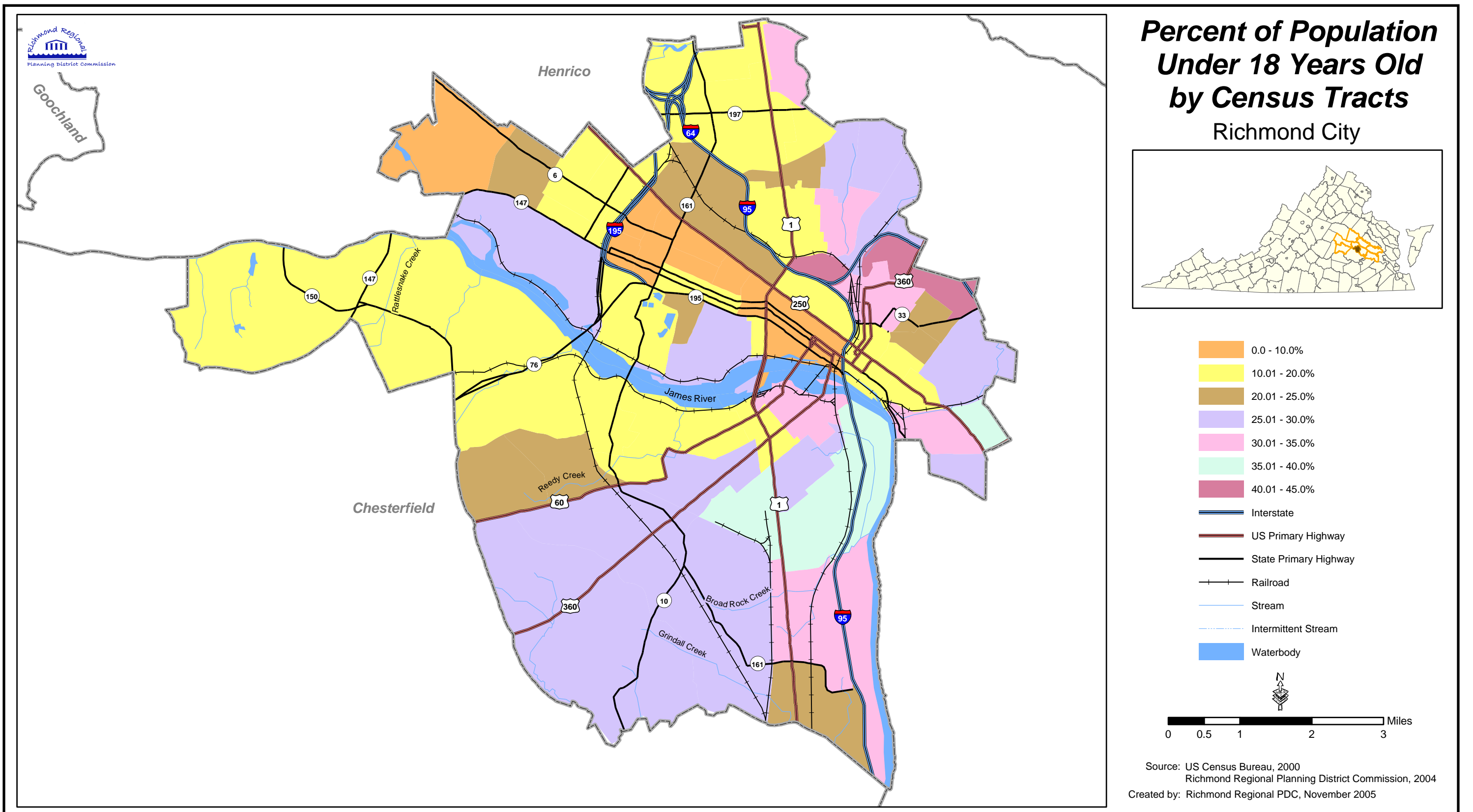
Richmond Regional Planning District Commission
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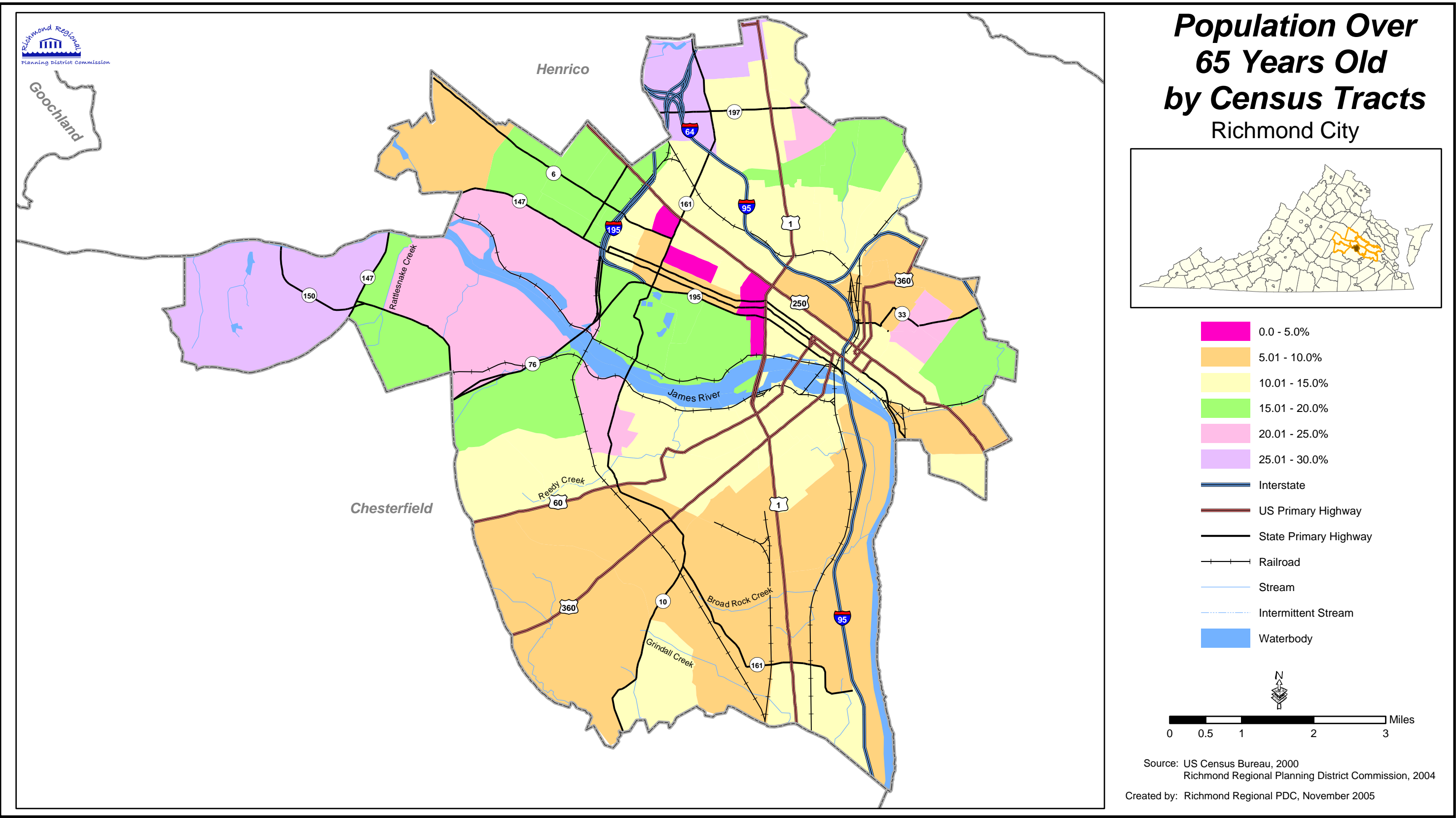
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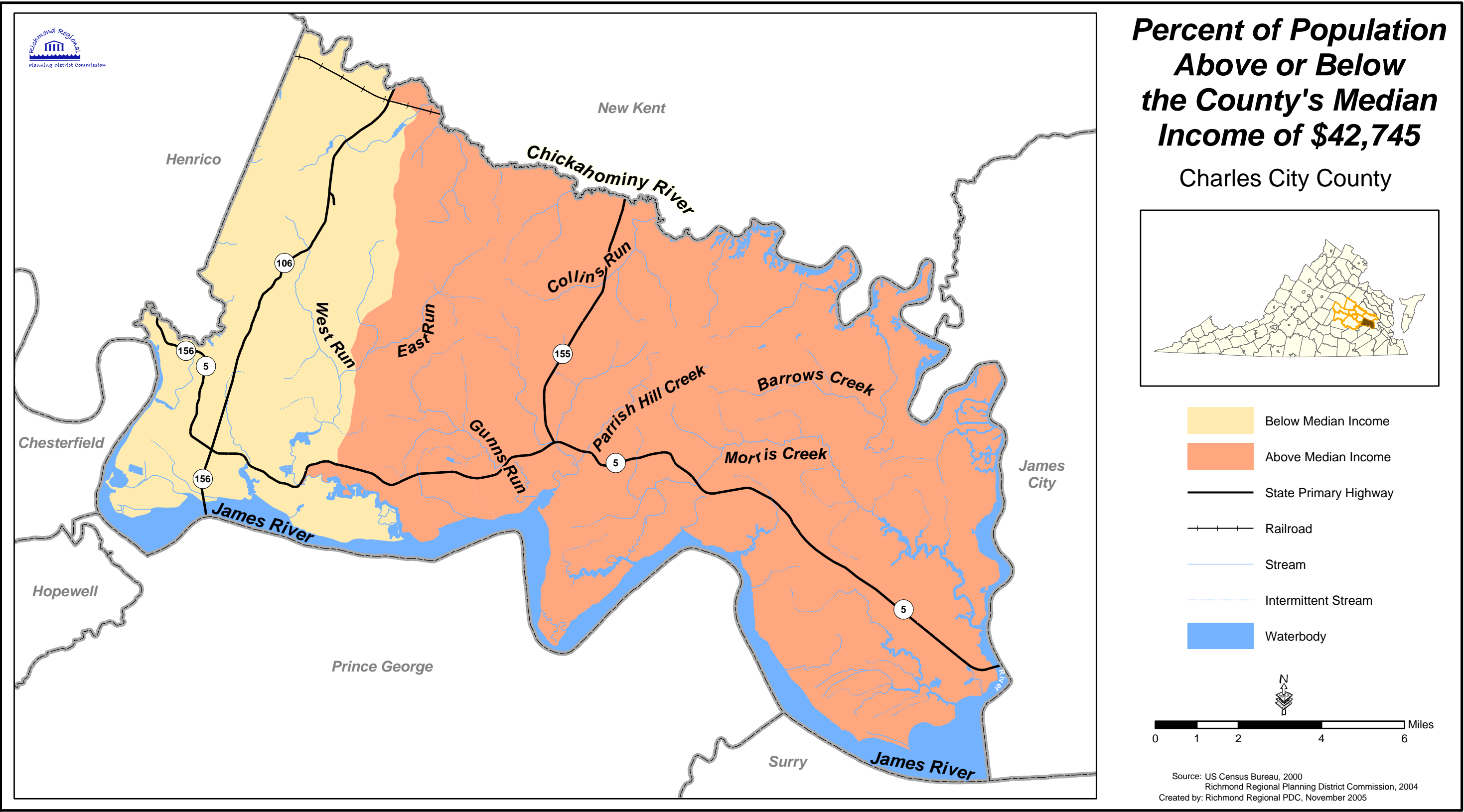
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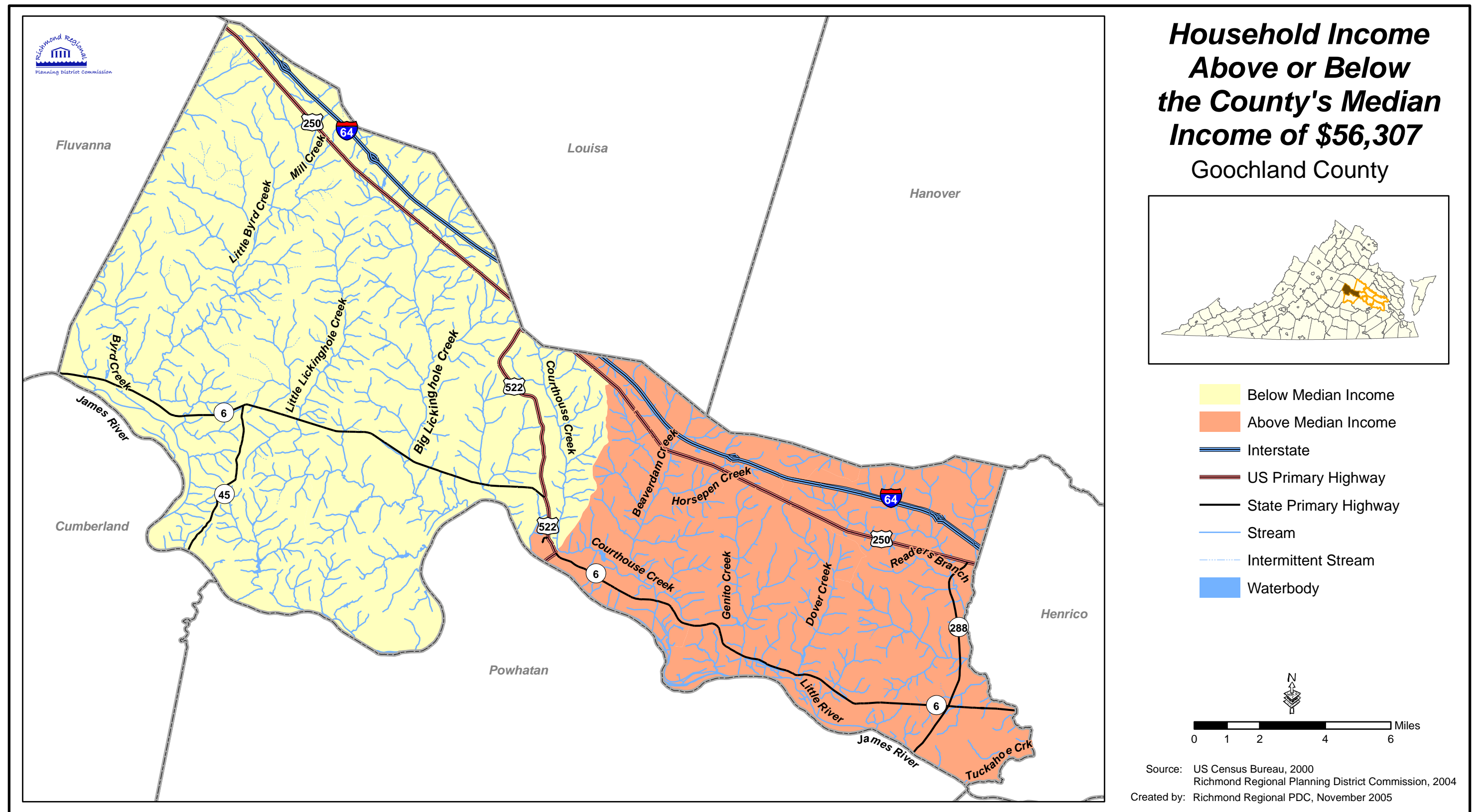
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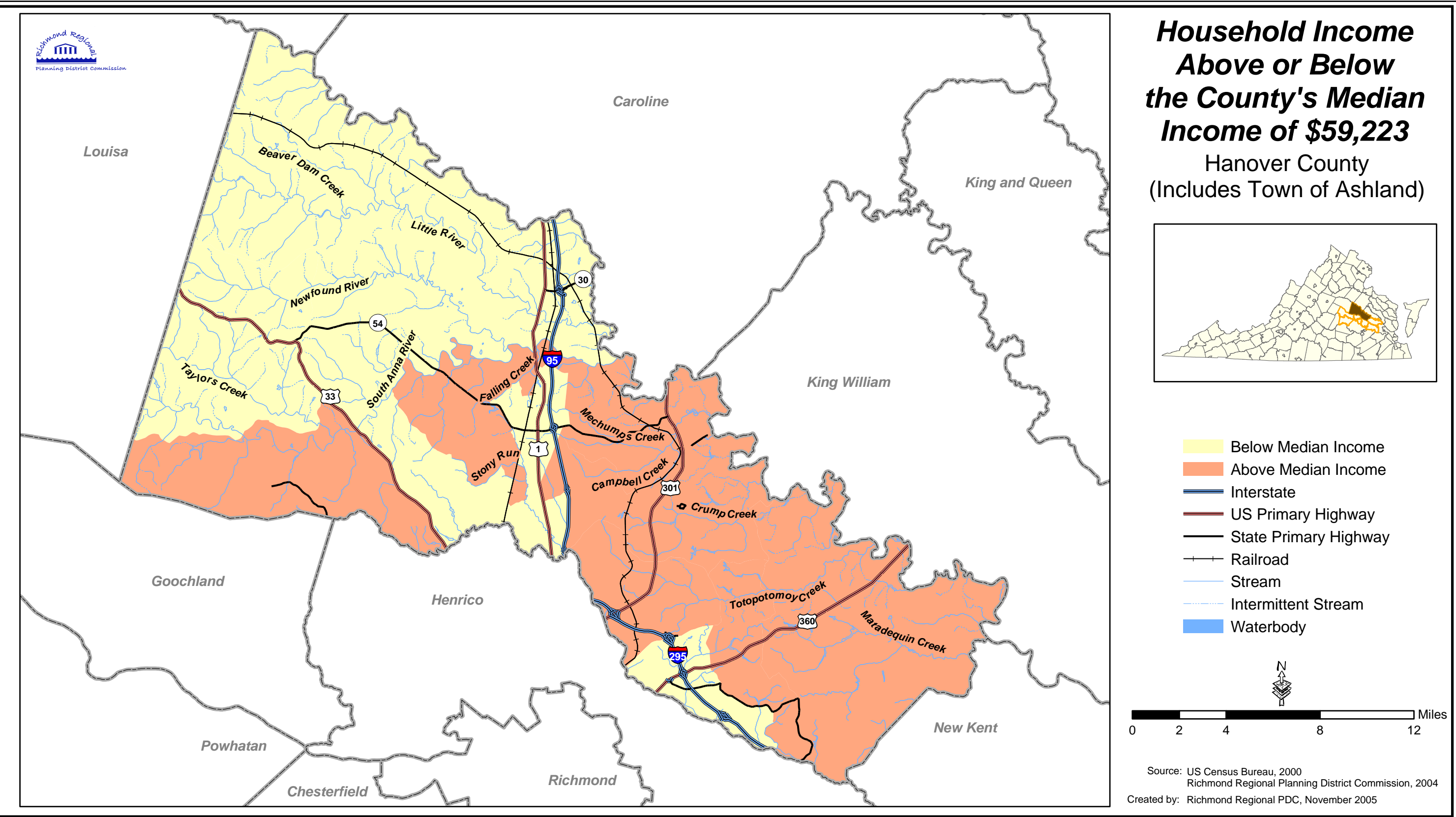
Median Income



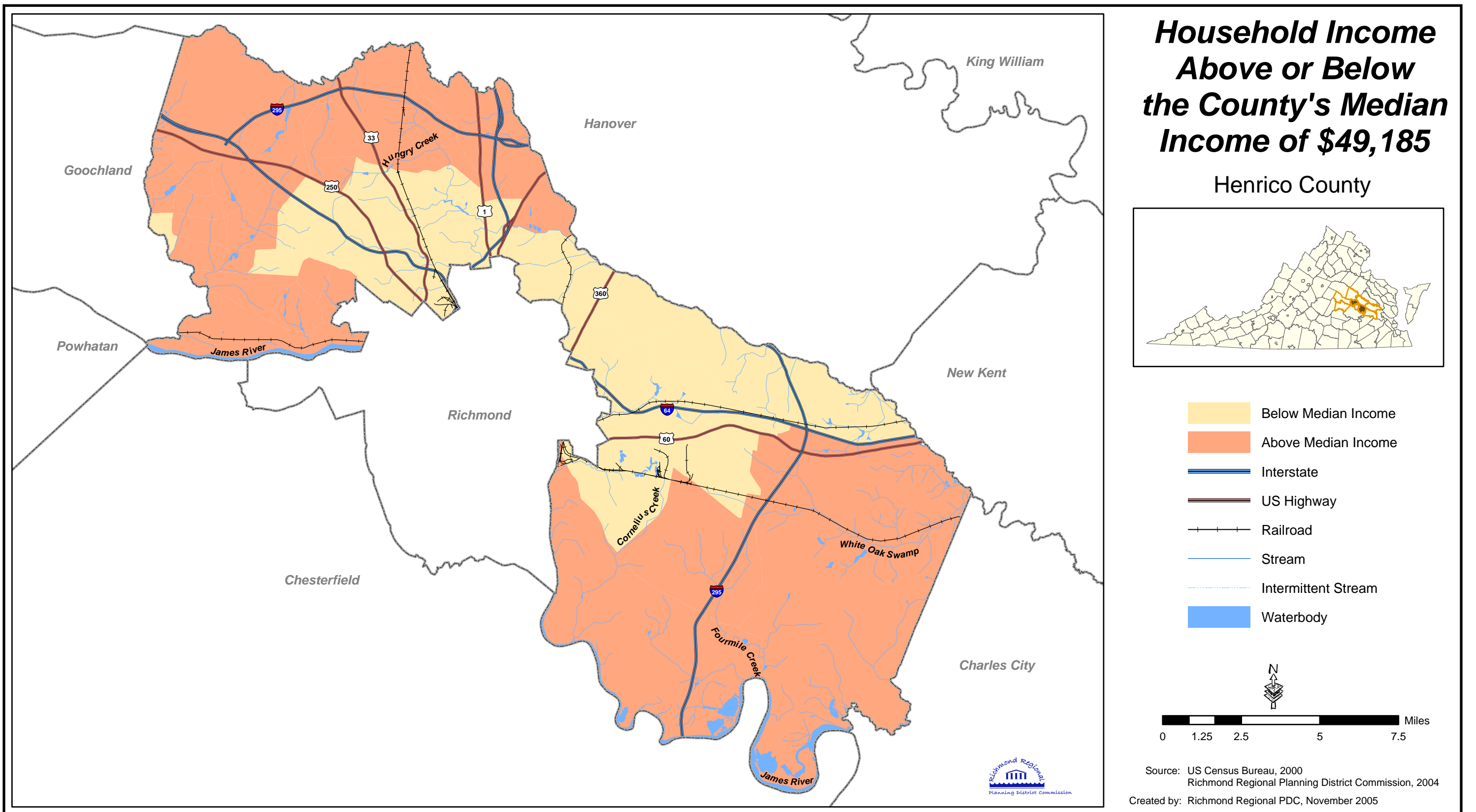
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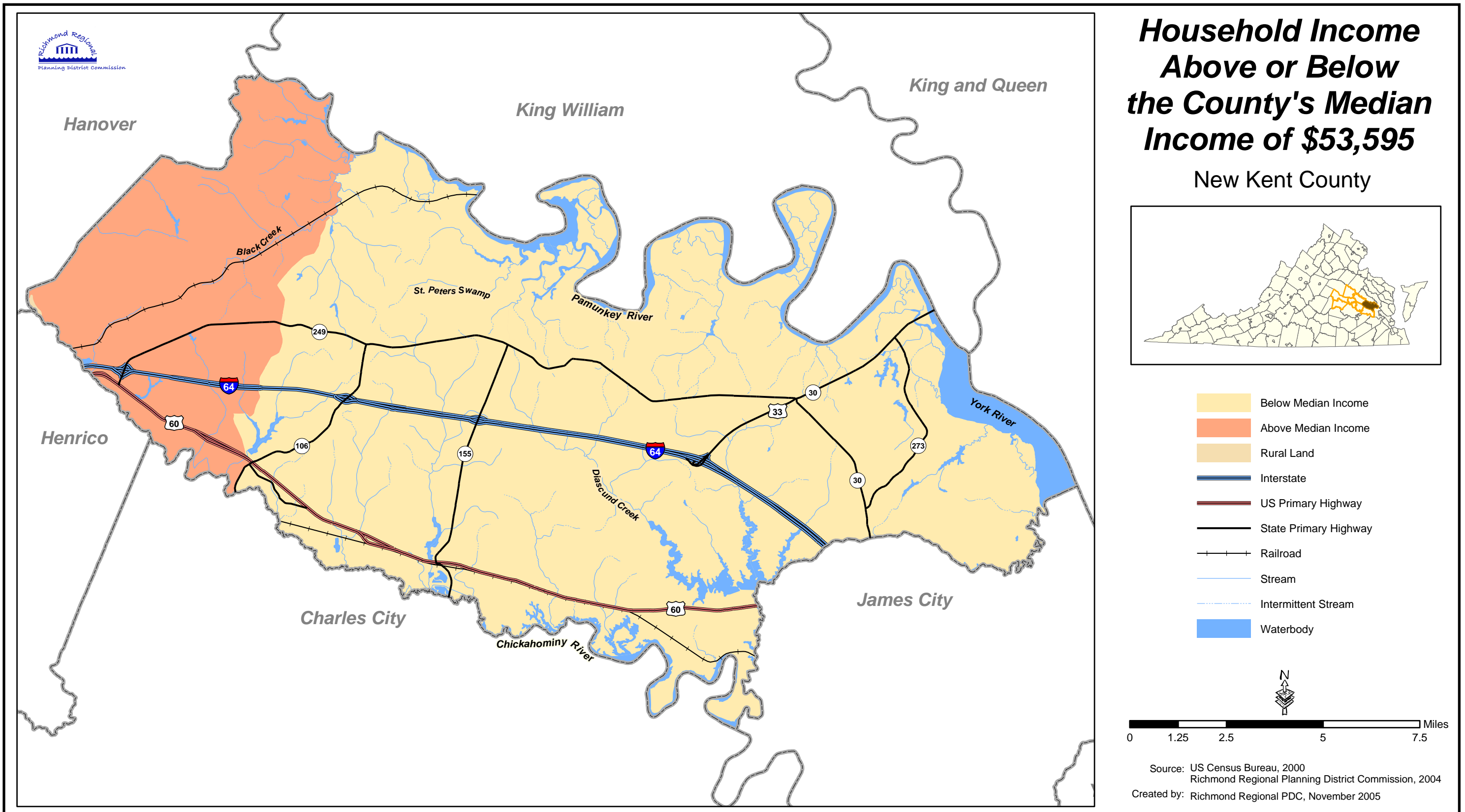
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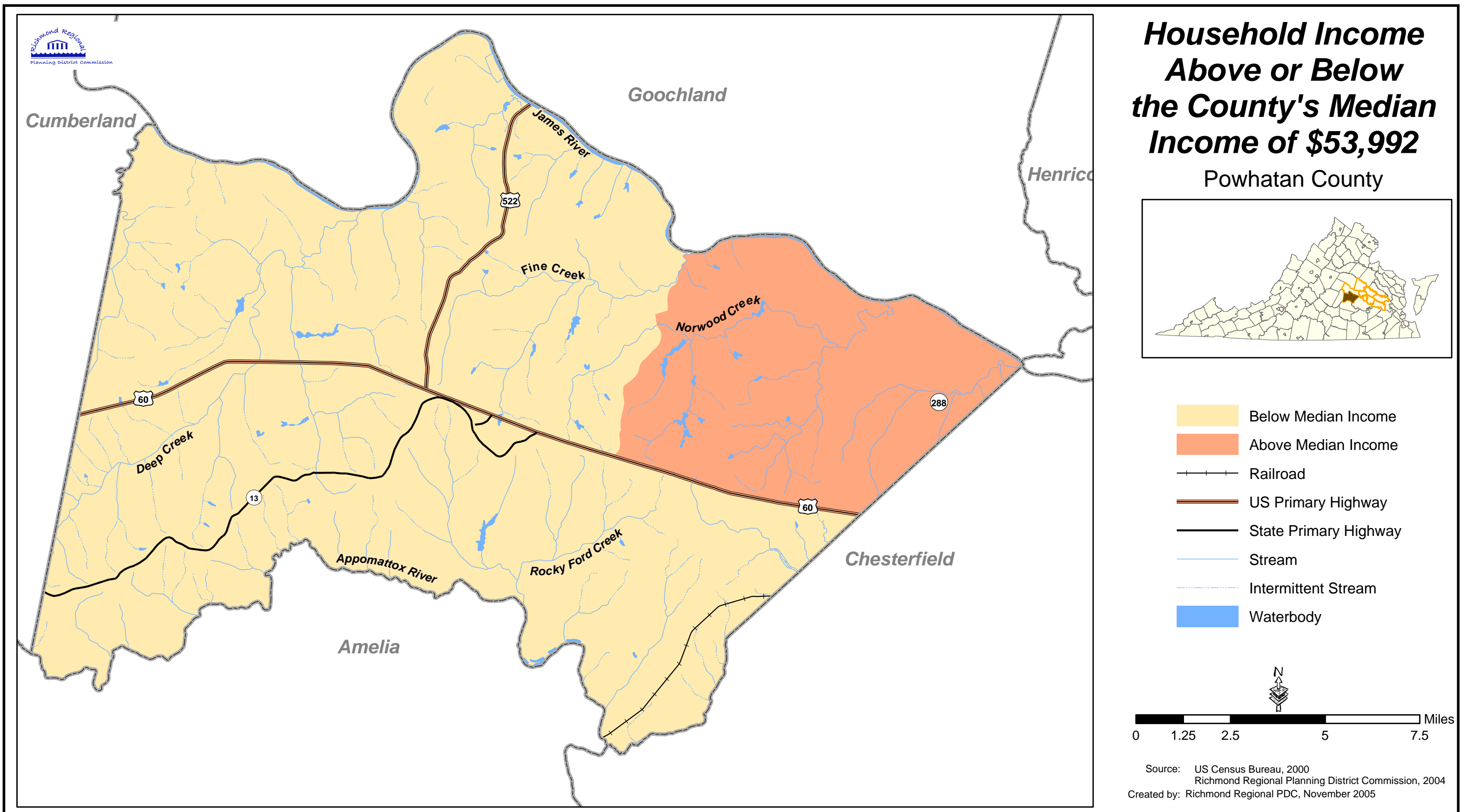
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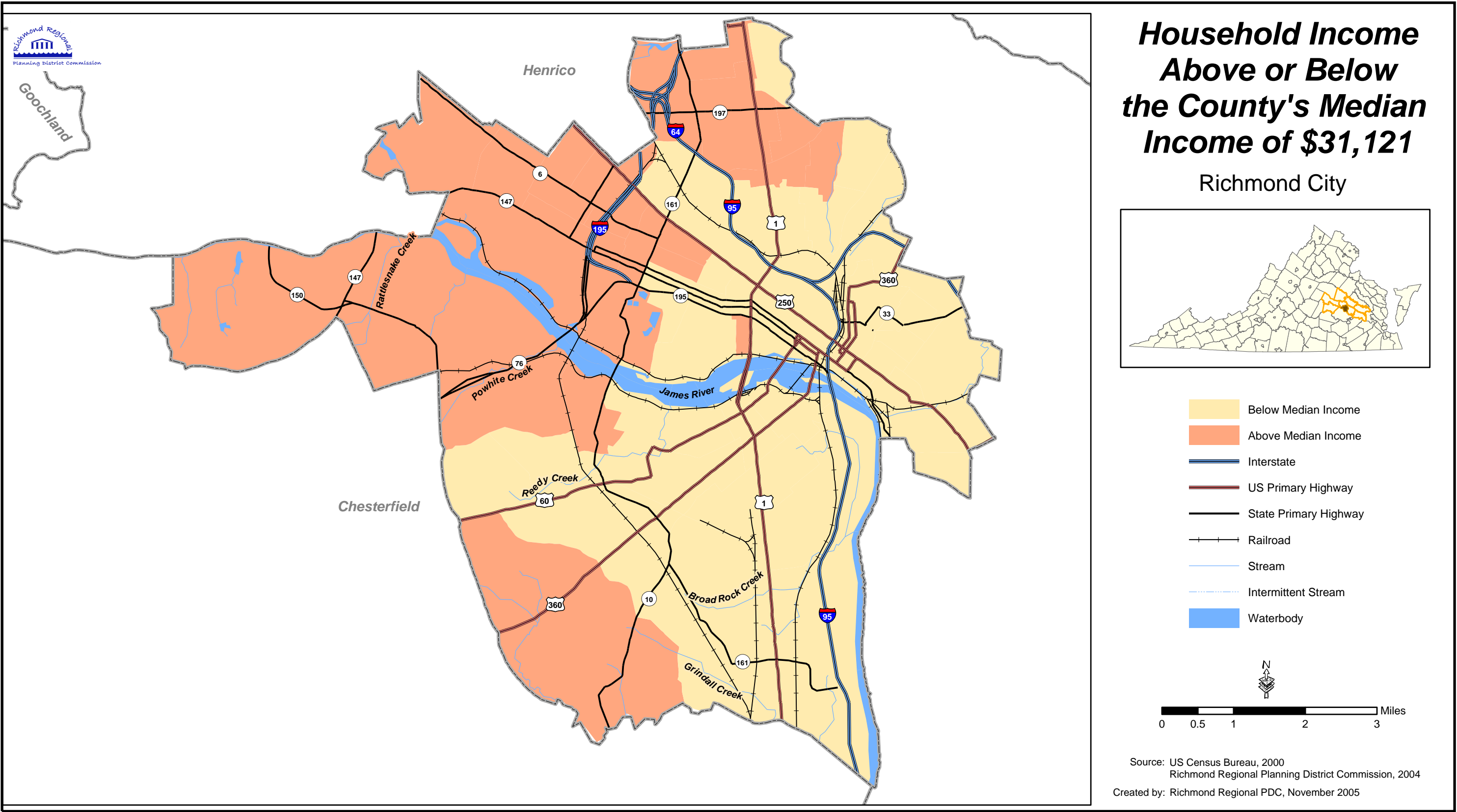
Richmond Regional Planning District Commission
DRAFT Hazard Mitigation Plan



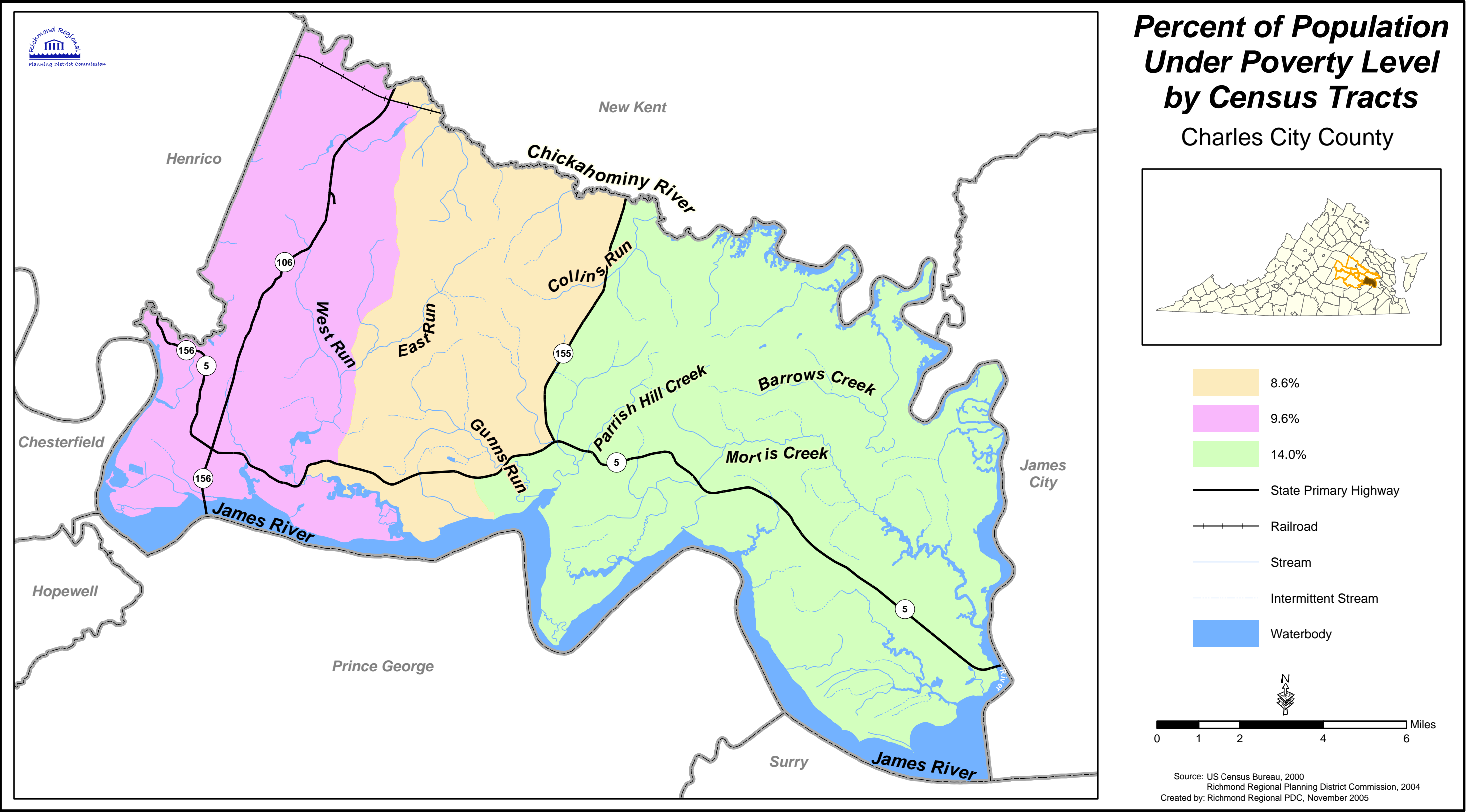
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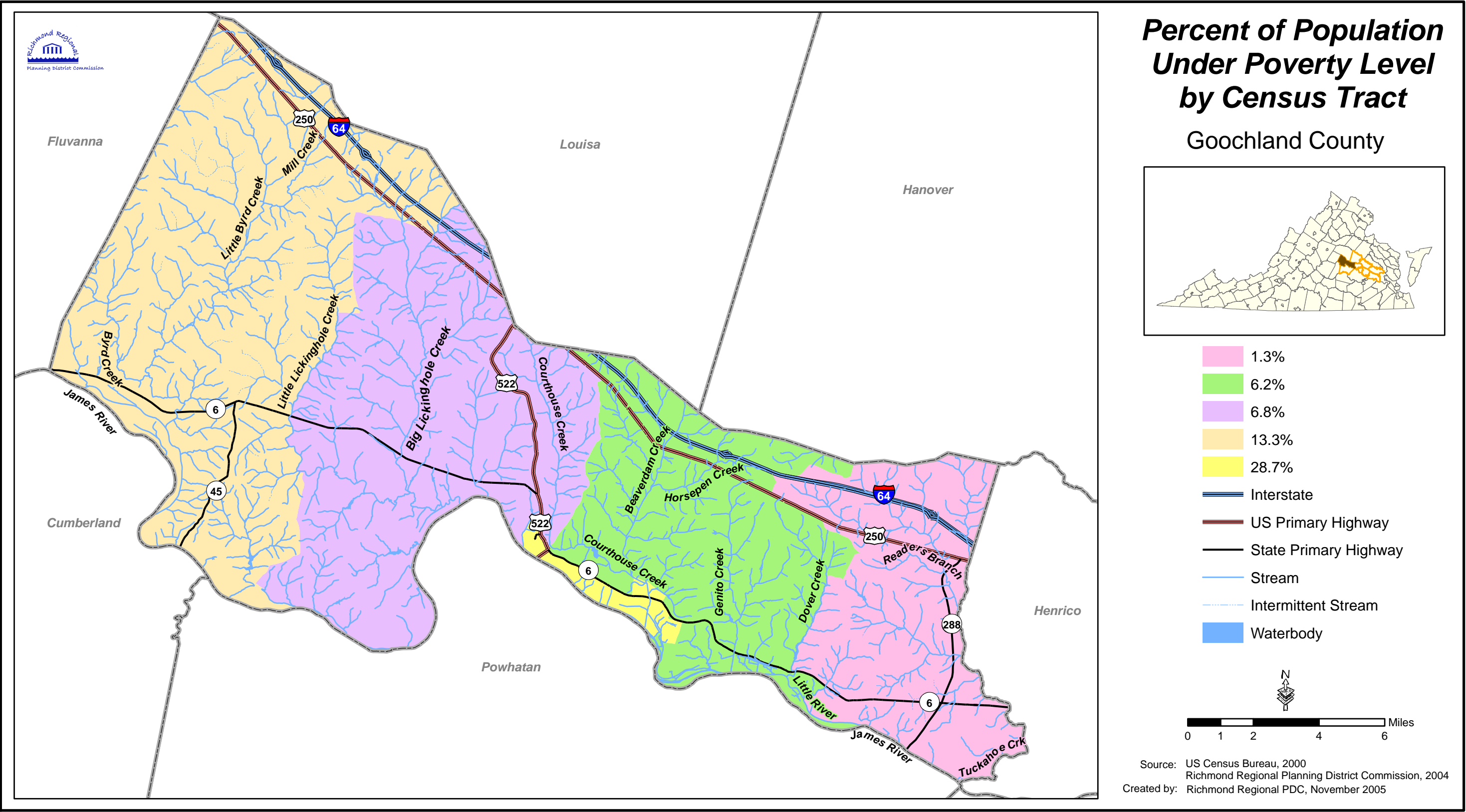


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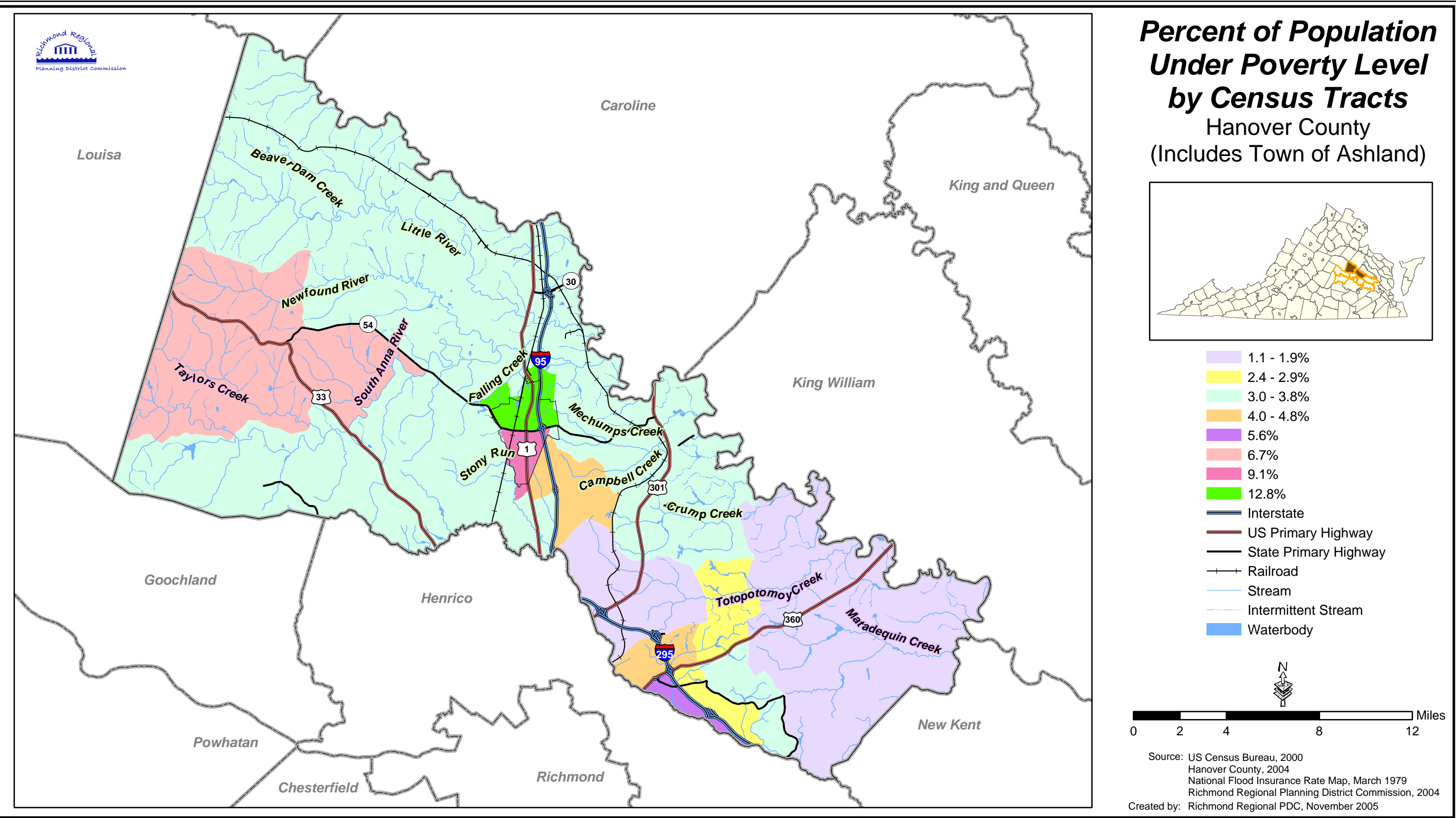


Poverty



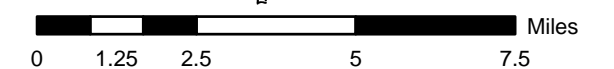
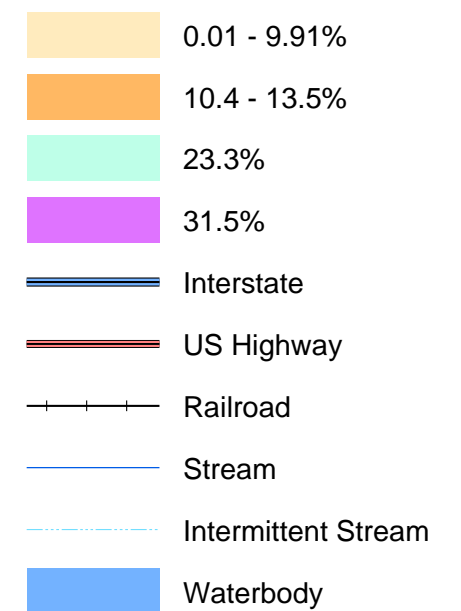
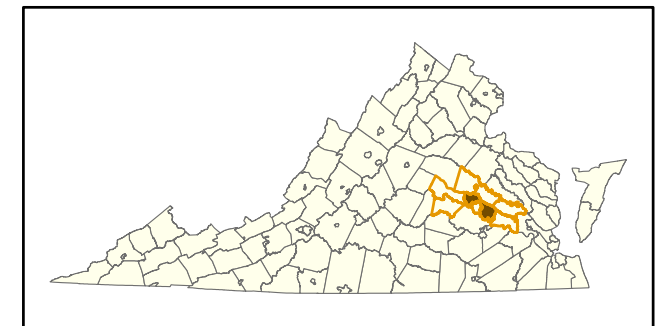


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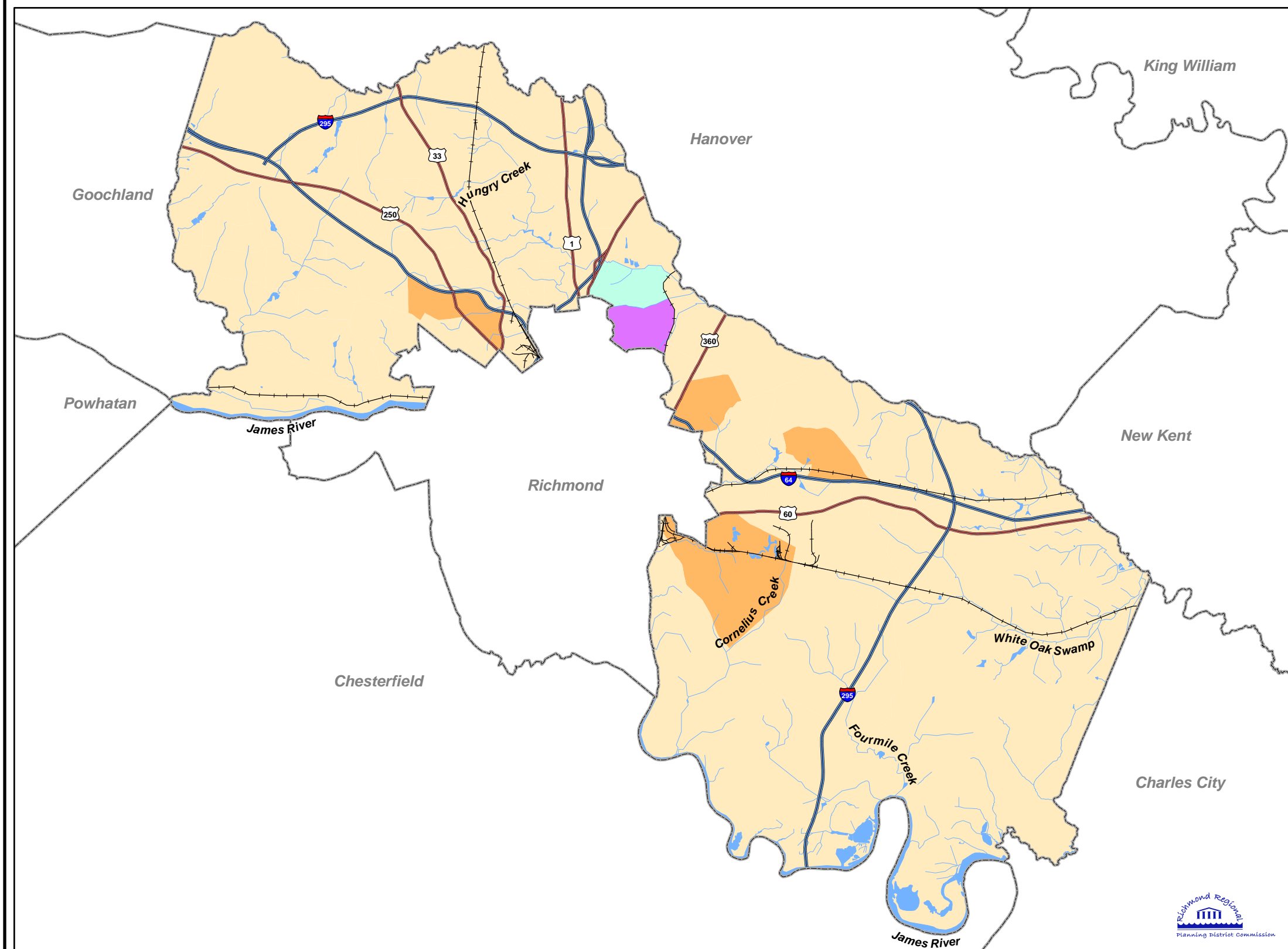


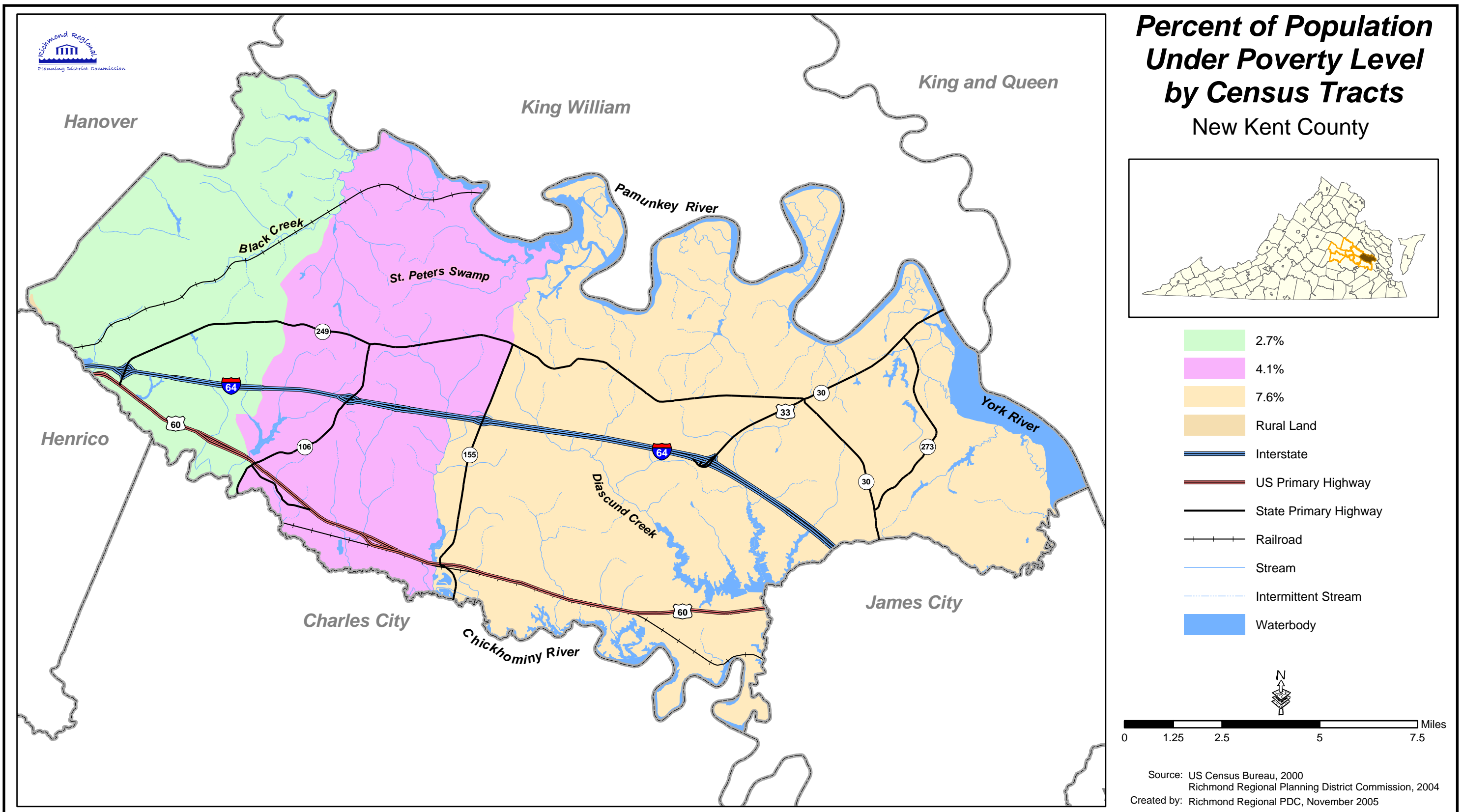
Percent of Population Under Poverty Level by Census Tracts

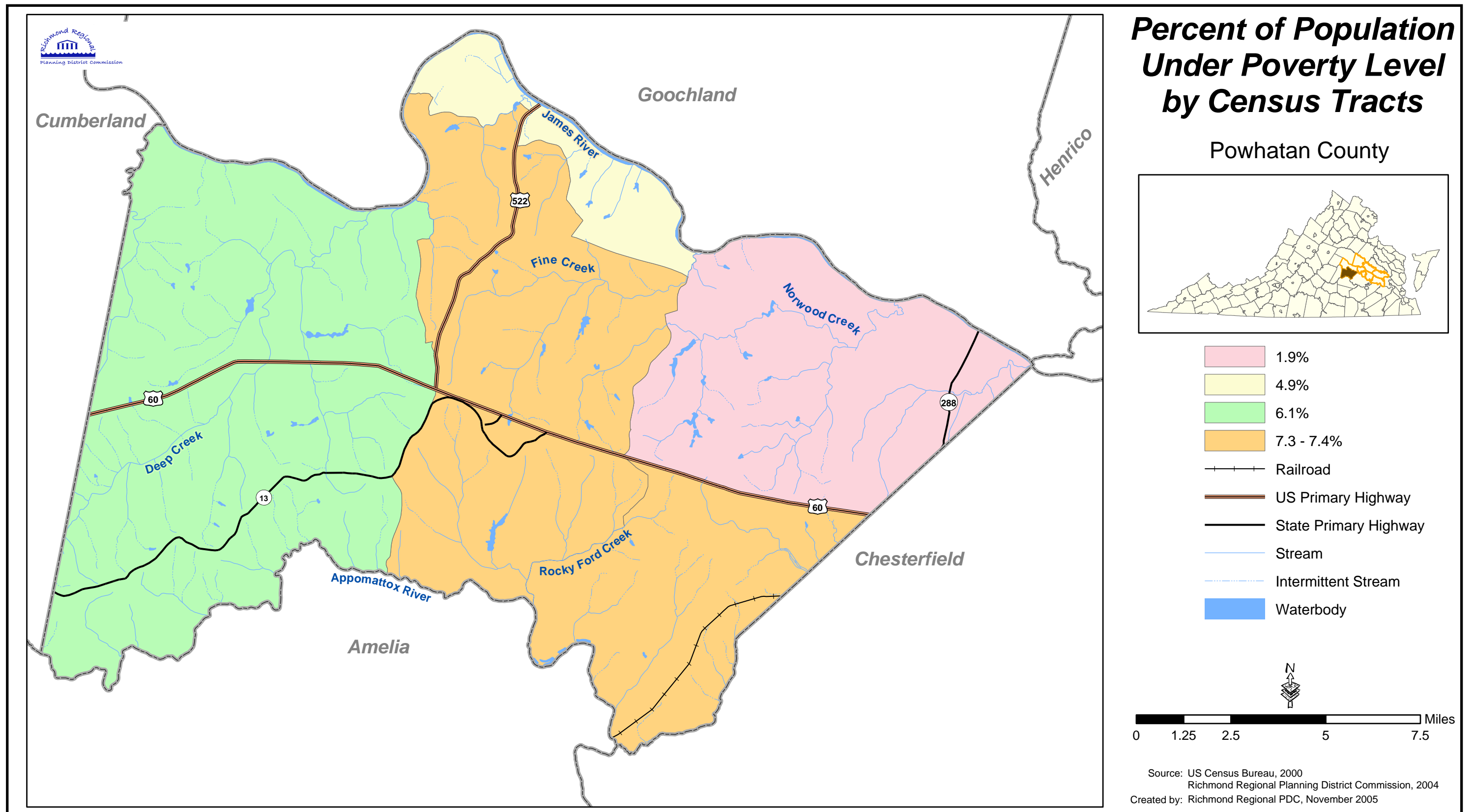
Henrico County



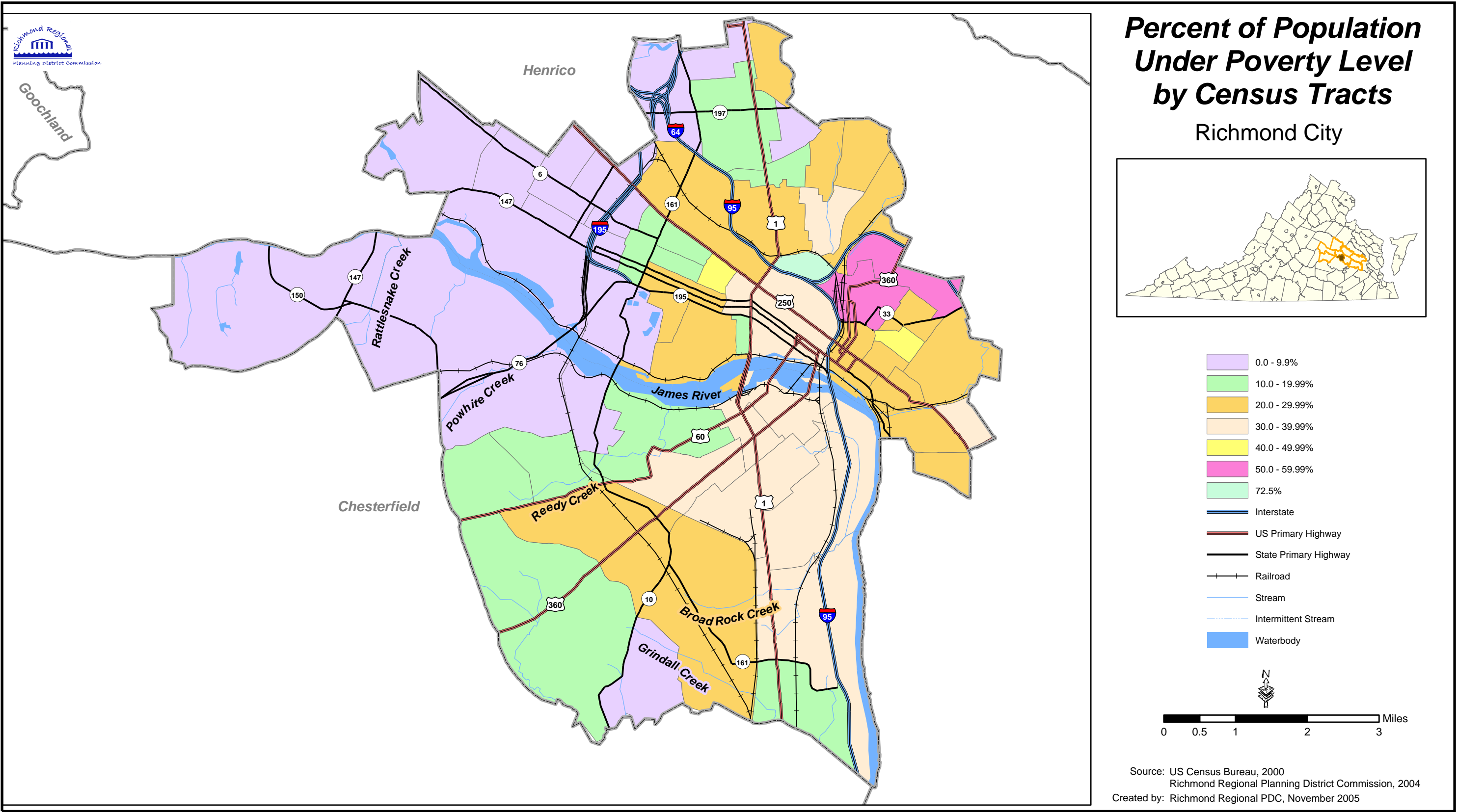
Source: US Census Bureau, 2000
Richmond Regional Planning District Commission, 2004
Created by: Richmond Regional PDC, November 2005







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APPENDIX C — DETAILED HAZARD IDENTIFICATION PARAMETERS AND METHODOLOGY

Based on all local and regional hazard data collected, an analysis of the potential hazards that can affect the Richmond Region was performed based on the four parameters that are described below. These four parameters were based on two separate factors — *the probabilities that a potential hazard will affect the region and the potential impacts on the region should a hazard event occur*. Hazard identification parameters and computations used to prioritize the potential hazards that can threaten the Richmond Region are listed in tabular form at the end of this appendix.

Mitigation Advisory Committee members were given an opportunity to provide input to the Hazard Identification. The worksheet was posted to the project website for review and comment. Powhatan County noted that “the Hazard Consideration for flooding is not as great as other parts of the region. We have no dwellings or commercial structures in the flood plain. Therefore we would have a lower ‘Affected Area’ and lower ‘Primary and Secondary Impacts.’” The Flood section of the analysis notes this differing degree of risk.

- **Probability** — This parameter addresses the probability that a potential hazard will affect the locality. The probability for each hazard was determined based on the history of events in the Richmond Region. Hazard probabilities were classified into one of four distinct categories by estimating the hazard’s average annual frequency, which is the probability of a specific hazard event occurring in the Richmond Region in a given year. Some average annual frequencies were relatively simple to estimate. For example, a review of Richmond Region’s tornado hazard history indicated the region has experienced 21 tornadoes over the past 100 years. Therefore, the average annual frequency of a tornado event occurring in any given year was $(21/100 \times 100) = 21\%$. However, the frequencies of other hazards in the region were more difficult to determine due to incomplete or limited historical data. In such cases, frequency estimates relied on experience with similar events in neighboring regions.
- **Affected Area** — This parameter is the first of three impact parameters, and addresses the potentially affected geographic area within the region should a hazard event occur. The extent of the affected area for each hazard was determined based on the specific characteristics of each hazard, the history of such events in the Richmond Region, and experience with similar events that

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have occurred in neighboring regions. The affected areas were classified into one of four distinct categories based on the extent of the locality directly impacted by the hazard, ranging from a single building or facility to a widespread area of the region.

- **Primary Impact** — This second impact parameter addresses the potential direct damages to locality buildings, facilities, and individuals should a hazard event occur. The primary impact was determined based on the specific characteristics of each hazard, the history of such events in the Richmond Region, and experience with similar events that have occurred in neighboring regions. Primary impacts were classified into one of four distinct categories by estimating the typical damage to a city building or facility from a given hazard, ranging from negligible (less than 10% damage) to catastrophic (greater than 50% damage).
- **Secondary Impacts** — This third impact parameter addresses the potential secondary impacts on the region should a hazard event occur. Note that while primary impacts are a direct result of the hazard, secondary impacts can only arise subsequent to a primary impact. For example, a primary impact of a flood event may be road closures due to submerged pavement; while a secondary impact could be restricted access of emergency vehicles to citizens in a portion of the community due to the road closure. Other examples of secondary impacts include loss of building or facility services (functional downtime), power outages, and mass evacuation of locality residents. The secondary impacts were determined based on the specific characteristics of each hazard, the history of such events in the Richmond Region, and experience with similar events that have occurred in neighboring regions. Secondary impacts were classified into one of four distinct categories by estimating the typical impacts to the city at large from a given hazard, ranging from negligible (no loss of function, downtime, and/or evacuations) to high (major loss of function, downtime, and/or evacuations).

Once these parameters were determined, a preference scale was utilized to arrive at a hazard level for each of the hazard types considered for the Richmond Region. The preference scale method has been used as a means of quantifying hazard assessment results in other communities, and similar scales were developed to rank alternatives in other FEMA documents such as FEMA Publication 259. The preference scale used for this hazard analysis first assigned a numerical value between 1 and 4 to each parameter, with 1 representing the lowest hazard potential and 4 being the highest. These numerical values were then modified by weighing each parameter by a factor to reflect the overall importance of that parameter, with 0.5 representing parameters

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of lowest importance and 2.0 representing parameters of highest importance. Importance factors also may be adjusted to reflect the level of confidence with the information supplied for a given parameter. For this reason, probability parameters were assigned a factor of 2.0 to reflect their high importance and the generally high confidence in the available information. However, the affected area, primary impact and secondary impacts parameter were assigned factors of 0.8, 0.7 and 0.5 to reflect their lower importance and the low confidence in the available information. Finally, the factored values assigned to the various parameters for each hazard were totaled, and the hazard types with the highest totals were considered the highest potential hazard level.

In order to quantify these hazard parameters, the following formula was developed to assign a value for probability and impact for each of the hazards considered.

$$\text{Hazard Level} = \text{Probability} \times \text{Impacts}$$

Where:

$$\text{Probability} = (\text{Probability score} \times \text{Importance factor})$$

$$\text{Impacts} = (\text{Affected Area} + \text{Primary Impact} + \text{Secondary Impacts})$$

$$\text{Affected Area} = \text{Affected Area score} \times \text{Importance factor}$$

$$\text{Primary Impact} = \text{Primary Impact score} \times \text{Importance factor}$$

$$\text{Secondary Impact} = \text{Secondary Impact score} \times \text{Importance factor}$$

The preference scale computations used to determine the hazard level for each of the potential hazards impacting the Richmond Region are summarized in tabular form at the end of this appendix. The hazard levels are broken down into four distinct categories that represent the likelihood of a hazard event of that type significantly impacting the Richmond Region: Significant, Moderate, Limited, and None. The level of *None* should be interpreted as not being critical enough to warrant further evaluation; however, these hazards should not be interpreted as having zero probability or impact. Note that the assigning of numerical values and importance factors for parameters is qualitative in nature and based on data from a number of sources with varying degrees of accuracy.

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| HAZARD ANALYSIS WORKSHEET - RICHMOND REGIONAL PLANNING DISTRICT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---------------|----------------|-------------------|-------------|-------------------------------|-------|---------------|-------|---|-----------------------------------|-----|---|--------------------------------------|-----|---|---------------------------------------|-----|---|-------------------------------------|-----|-------------|---------|--------------|--------------|--|------|---|--|------|------|--|---------|------|---|---|----------|------|------|---|-------------|
| Hazard Type | Probability | Impact | | | Total Score | Hazard Planning Consideration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Affected Area | Primary Impact | Secondary Impacts | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SEVERE WINTER STORM | 3 | 4 | 2 | 3 | 37 | Moderate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DROUGHT | 2 | 4 | 4 | 1 | 26 | Limited | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EARTHQUAKE | 1 | 4 | 2 | 2 | 11 | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WILDFIRE | 2 | 2 | 4 | 4 | 26 | Limited | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FLOODING | 4 | 3 | 4 | 4 | 58 | Significant | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EXTREME HEAT | 2 | 4 | 1 | 1 | 18 | Limited | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LANDSLIDES, LAND SUBSIDENCE, SOIL EROSION | 3 | 1 | 1 | 1 | 12 | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SEVERE WIND (Hurricane) | 3 | 4 | 3 | 3 | 41 | Moderate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HAIL STORM | 3 | 2 | 1 | 1 | 17 | Limited | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TORNADO | 2 | 1 | 4 | 2 | 18 | Limited | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Probability Importance: 2.0</p> <p><i>Based on estimated likelihood of occurrence from historical data</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Level</th> <th>Probability</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Unlikely</td> <td>2</td> </tr> <tr> <td>2</td> <td>Somewhat Likely</td> <td>4</td> </tr> <tr> <td>3</td> <td>Likely</td> <td>6</td> </tr> <tr> <td>4</td> <td>Highly Likely</td> <td>8</td> </tr> </tbody> </table> </div> <div style="width: 45%;"> <p>Secondary Impacts Importance: 0.5</p> <p><i>Based on estimated secondary impacts to community at large</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Level</th> <th>Impact</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Negligible - no loss of function, downtime, and/or evacuations</td> <td>0.5</td> </tr> <tr> <td>2</td> <td>Limited - minimal loss of function, downtime, and/or evacuations</td> <td>1</td> </tr> <tr> <td>3</td> <td>Moderate - some loss of function, downtime, and/or evacuations</td> <td>1.5</td> </tr> <tr> <td>4</td> <td>High - major loss of function, downtime, and/or evacuations</td> <td>2</td> </tr> </tbody> </table> </div> </div> | | | | | | | Level | Probability | Score | 1 | Unlikely | 2 | 2 | Somewhat Likely | 4 | 3 | Likely | 6 | 4 | Highly Likely | 8 | Level | Impact | Score | 1 | Negligible - no loss of function, downtime, and/or evacuations | 0.5 | 2 | Limited - minimal loss of function, downtime, and/or evacuations | 1 | 3 | Moderate - some loss of function, downtime, and/or evacuations | 1.5 | 4 | High - major loss of function, downtime, and/or evacuations | 2 | | | | | |
| Level | Probability | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Unlikely | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Somewhat Likely | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Likely | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Highly Likely | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level | Impact | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Negligible - no loss of function, downtime, and/or evacuations | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Limited - minimal loss of function, downtime, and/or evacuations | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Moderate - some loss of function, downtime, and/or evacuations | 1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | High - major loss of function, downtime, and/or evacuations | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Affected Area Importance: 0.8</p> <p><i>Based on size of geographical area of community affected by hazard</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Level</th> <th>Affected Area</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Isolated</td> <td>0.8</td> </tr> <tr> <td>2</td> <td>Small</td> <td>1.6</td> </tr> <tr> <td>3</td> <td>Medium</td> <td>2.4</td> </tr> <tr> <td>4</td> <td>Large</td> <td>3.2</td> </tr> </tbody> </table> </div> <div style="width: 45%;"> <p>Total Score = Probability x Impact, where: Probability = (Probability Score x Importance) Impact = (Affected Area + Primary Impact + Secondary Impacts), where: Affected Area = Affected Area Score x Importance Primary Impact = Primary Impact Score x Importance Secondary Impacts = Secondary Impacts Score x Importance</p> </div> </div> | | | | | | | Level | Affected Area | Score | 1 | Isolated | 0.8 | 2 | Small | 1.6 | 3 | Medium | 2.4 | 4 | Large | 3.2 | | | | | | | | | | | | | | | | | | | | |
| Level | Affected Area | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Isolated | 0.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Small | 1.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Medium | 2.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Large | 3.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Primary Impact Importance: 0.7</p> <p><i>Based on percentage of damage to typical facility (including farms) in community</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Level</th> <th>Impact</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Negligible - less than 10% damage</td> <td>0.7</td> </tr> <tr> <td>2</td> <td>Limited - between 10% and 25% damage</td> <td>1.4</td> </tr> <tr> <td>3</td> <td>Critical - between 25% and 50% damage</td> <td>2.1</td> </tr> <tr> <td>4</td> <td>Catastrophic - more than 50% damage</td> <td>2.8</td> </tr> </tbody> </table> </div> <div style="width: 45%;"> <p>Hazard Level</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Total Score</th> <th>(Range)</th> <th>Distribution</th> <th>Hazard Level</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>12.0</td> <td>2</td> <td>None</td> </tr> <tr> <td>12.1</td> <td>28.0</td> <td>5</td> <td>Limited</td> </tr> <tr> <td>28.1</td> <td>48.0</td> <td>2</td> <td>Moderate</td> </tr> <tr> <td>48.1</td> <td>64.0</td> <td>1</td> <td>Significant</td> </tr> </tbody> </table> </div> </div> | | | | | | | Level | Impact | Score | 1 | Negligible - less than 10% damage | 0.7 | 2 | Limited - between 10% and 25% damage | 1.4 | 3 | Critical - between 25% and 50% damage | 2.1 | 4 | Catastrophic - more than 50% damage | 2.8 | Total Score | (Range) | Distribution | Hazard Level | 0.0 | 12.0 | 2 | None | 12.1 | 28.0 | 5 | Limited | 28.1 | 48.0 | 2 | Moderate | 48.1 | 64.0 | 1 | Significant |
| Level | Impact | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Negligible - less than 10% damage | 0.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Limited - between 10% and 25% damage | 1.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Critical - between 25% and 50% damage | 2.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Catastrophic - more than 50% damage | 2.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Score | (Range) | Distribution | Hazard Level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.0 | 12.0 | 2 | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12.1 | 28.0 | 5 | Limited | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28.1 | 48.0 | 2 | Moderate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 48.1 | 64.0 | 1 | Significant | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|--------------|------------|--|--------------------------|---------------------------|--------|----------|---------------------|-------------|
| 5/1771 | Flood | Greatest in the James Basin since Jamestown was founded in 1607. | | Henrico, City of Richmond | | | | 1, 5 |
| 2/21/1774 | Earthquake | Near Petersburg, Prince George County, Va. A sharp earthquake that was felt over much of Virginia displaced houses "considerably off their foundations" at Blandford and Petersburg. Although the shock was severe at Richmond and terrified residents about 80 km north of Richmond at Fredericksburg, it caused no damage at those towns. Several "smart shocks" were reported in parts of Virginia from Feb. 20th to the 22nd. The main tremor rang bells at Salem (now Winston-Salem), N.C. Magnitude 4.5 Mfa NUT. (Ref. 55, 167, 314.) | | City of Richmond | | | | 2 |
| 4/6/1790 | Tornado | Tornado struck Charles City and Dinwiddie Counties destroying four mills and blowing down four houses at the New Glass Manufactory with people in them who were injured but not killed. | | Charles City | | yes | | 12 |
| 7/27/1816 | Tornado | A tornado touched down in Henrico County and moved near Manchester, killing two people and injuring 3 more. It was on the ground about 14 miles. | | Henrico | 2 | 3 | | 12 |
| 6/4/1817 | Tornado | A tornado touched down in Henrico County moved east from the southern part of Chickahominy (about 15 miles north of downtown Richmond) across Henrico County to the Pamunky River in King William County, causing widespread destruction. The tornado was about 200 to 300 yards wide. It swept over several plantations. One person was killed and four injured in Hanover and another was killed in King William County. Leaves and twigs fell on Richmond. "The whirlwind extended to a dark bluish cloud, whirling the lower end if it as quick as a millstone." | | Henrico, Hanover | 1 | 4 | | 12 |
| 2/1820 | Tornado | A tornado struck Richmond around midnight causing extensive structural damage. | | City of Richmond | | | | 12 |
| 8/24-25/1827 | Hurricane | Hurricane was severe on the coast and inland to the mountains and caused damage from Charleston to Baltimore. | | Greater Richmond | | | | 11 |
| 8/27/1833 | Earthquake | VI intensity | | Goochland | | | | 3 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|------------|--|--------------------------|---------------------------------------|--------|----------|---------------------|-------------|
| 2/2/1852 | Earthquake | Chimney damage occurred at Buckingham, about 55 km south of Charlottesville. This earthquake was reported to be "quite strong" at Fredericksburg, Richmond, and Scottsville. At Scottsville, where every house in the village was shaken, water in the canal was "troubled," and boats were tossed to and fro. Magnitude 4.3 Mfa NUT. (Ref. 55, 167.) | | City of Richmond | | | | 2 |
| 10/1870 | Flood | The worst flood in 100 years collapsed the third floor of the Virginia Capitol, killing 60 and injuring 250. | | City of Richmond | | | | 4 |
| 12/23/1875 | Earthquake | The highest intensities from this earthquake occurred mainly at towns near the James River waterfront in Goochland and Powhatan Counties, and in Louisa County. In Richmond (Henrico County), the most severe damage was sustained in the downtown business and residential areas adjacent to the James River or on islands in the river. Damage included bricks knocked from chimneys, fallen plaster, an overturned stove, and several broken windows. Waves "suddenly rose several feet" at the James River dock at Richmond, causing boats to "part their cables" and drift below the wharf. At Manakin, about 20 km west of Richmond, shingles were shaken from a roof and many lamps and chimneys were broken. Several small aftershocks were reported through Jan. 2, 1876. Felt from Baltimore, Md., to Greensboro, N.C., and from the Atlantic Coast westward to Greenbrier and White Sulphur Springs, W.Va. Magnitude 4.5 Mfa NUT. (Ref 55, 167, 365.) | | Goochland, Powhatan, City of Richmond | | | | 2 |
| 11/1877 | Flood | No detail available. | | Henrico, Powhatan, City of Richmond | | | | 1, 5 |
| 9/12/1878 | Tornado | Hurricane spawned several tornadoes in Virginia between 1 and 4 pm. A fourth hit in Henrico where 1 death and 7 injuries occurred. The last one was documented hitting Goochland near Dover Mills and was on the ground for 28 miles. | | Henrico, Goochland | 1 | 7 | | 11 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|---------------|-------------------|---|--------------------------|-------------------------------------|--------|----------|---------------------|-------------|
| 10/22-23/1878 | Hurricane | The hurricane's eye made landfall at Cape Fear and moved north across Richmond and Washington, DC and seemed to lose little strength. The storm was thought to resemble that of Hurricane Hazel in 1954. Winds downed trees and fences and unroofed homes. | | City of Richmond | | | | 11 |
| 9/29/1896 | Hurricane | Hurricane killed 16 people and did almost \$4 million in damages up the Eastern Seaboard. The Richmond News Leader on June 14, 1951 after a tornado had struck the city wrote "Tornado recalls windstorm of 1896 to older residents..." Speaking of September 29, "torrential rain and very high wind for several hours in the evening. Wind estimated at 80 mph...caused a steeple to fall." | | City of Richmond | | | 4,000,000 | 11 |
| 5/1/1901 | Flood | No detail available. | | Powhatan | | | | 1 |
| 1913 | Flood | No detail available. | | City of Richmond | | | | 1 |
| 8/1/1928 | Flood | No detail available. | | Hanover | | | | 1 |
| 3/28/1932 | Tornado | At just past midnight, a home was destroyed by a F2 tornado near Centerville in Goochland County. Four people were critically injured. | | Goochland | | 4 | | 12 |
| 8/23/1933 | Hurricane (flood) | Storm surge in the bay and tidal estuaries was the highest of record and coincided with astronomical high tide. The water level reached a maximum of 8 feet in Hampton Roads. | | Charles City County, New Kent | | | | 1 |
| 9/5/1935 | Hurricane (flood) | "The Great Labor Day Hurricane." Heavy rains fell over central Virginia from the storm and a major flood resulted on the James River in Richmond. Water level at the Richmond locks reached 23.7 ft which is over 15 feet above flood stage. | | Hanover, City of Richmond | | | | 1, 11 |
| 1/1/1936 | Flood | No detail available. | | Hanover, City of Richmond | | | | 1, 5 |
| 3/1/1936 | Flood | No detail available. | | Henrico, Powhatan | | | | 1 |
| 4/1/1937 | Flood | No detail available. | | Hanover, Powhatan, City of Richmond | | | | 1 |
| 8/1/1940 | Flood | No detail available. | | Henrico, Powhatan, City of Richmond | | | | 1 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|--------------|--------------|---|--------------------------|-------------------------------------|--------|----------|---------------------|-------------|
| 1/23-24/1940 | Winter Storm | The storm also set a number of records for Richmond. Official records in Richmond began in 1897. The storm dropped almost two feet of snow (21.6 inches) in 24 hours and helped set a record for the month of 28.5 inches. Richmond was shut down with drifts as deep as four feet. Businesses were closed for a couple of days and some schools for a week. There were 12 deaths attributed to the storm in Virginia with damages estimated at half a million dollars. With fresh snow on the ground, temperatures fell. On the six days following the storm, low temperatures dropped below zero with the coldest day setting a new all time record of -12°F. This was also the coldest month of February on record for Richmond. | | City of Richmond | | | | 8 |
| 10/1/1942 | Flood | No detail available. | | Hanover | | | | 1 |
| 1/22-28/1943 | Winter Storm | Three years after Richmond's big snowfall, Richmond was hit with its worst ice storm of record up to that time. The ice accumulated to a glaze an inch thick. The weight of the ice was too much for utility poles and wires bringing them down and cutting off electricity and telephone service. Thousands of trees were damaged or destroyed by the weight of the ice. | | City of Richmond | | | | 8 |
| 9/1/1944 | Flood | No detail available. | | Henrico, Powhatan, City of Richmond | | | | 1 |
| 8/1/1948 | Flood | No detail available. | | Hanover | | | | 1 |
| 12/1/1948 | Flood | No detail available. | | City of Richmond | | | | 1 |
| 12/1/1949 | Flood | No detail available. | | Hanover | | | | 1 |
| 6/1/1951 | Tornado | Resembled Sept. 29, 1896 storm | | City of Richmond | | | | 12 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------------------------|------------|---|--------------------------|----------------------|--------|----------|---------------------|-------------|
| 6/13/1951 | Tornado | A severe tornado (F3) cut through the heart of Richmond (pop. 230,000) on this late afternoon. It left a four mile path of damage that sent a dozen people to the hospital, injured scores more, and left over a hundred homeless. Thirty-five buildings were destroyed and 126 received major damage; a 1000 buildings in all were damaged. Damage estimates were over one million dollars. The tornado was seen tossing a car 30 to 40 feet into the air. Eyewitness accounts were reported in the next day's Richmond Times-Dispatch (Vol. 101, No. 165): "It came on fast. It sounded to me like an earthquake. I saw rooftops flying through the air. Pieces of tin and trees were falling on South Granby Street. When it hit my house, the back of the house came down. All the houses along here got hit in the back, and they all were half ripped down." - Perl Price, 1835 Rosewood Avenue. | | City of Richmond | | 12 | 1,000,000 | 7, 12 |
| 6/13/1951 Tornado continued | | I had spotted the twister when I was near the Jefferson Hotel. It was a great swirling mass of wind, and I thought at first that there was a huge fire somewhere. There wasn't any cone or funnel, like you expect with a tornado. The wind seemed to swirl and swoop up everything from the edges, carrying leaves and debris in and up. The air seemed to be full of all kinds of objects. - Louis J. Patterson, Richmond Times-Dispatch photographer. And from the Richmond News Leader came this quote by John L. Walker: "Four different clouds - all funnel-shaped - were rushing toward the city. Each one had a tail like a kite. Then the four came together in the shape of a huge auger that picked up everything in front of it." This report suggests that it was a multi-vortex tornado with, at one point, four vortices visible. The strong Petersburg Tornado in 1993 was also a multi-vortex tornado. | | | | | | |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|--------------|--------------------|---|--------------------------|--|--------|----------|---------------------|-------------|
| 10/1/1954 | Hurricane | Hurricane Hazel produced record wind gusts over the eastern portion of Virginia and Maryland. Gusts to around 100 mph were common east of Richmond and Fairfax, Va. Virginia lost 13 people and statewide damage was conservatively estimated at \$15 million. Richmond 68 mph winds with a maximum gust to 79 mph. Hundreds of thousands of trees were destroyed. Half of the phone and electric lines in the state were knocked out equaling 2 million dollars in damages. 200 plate glass store fronts in Richmond were broken. Four people died when a tug capsized on the James River about 25 miles from Richmond. Piers were demolished and private docks swept away in the Tidewater rivers. Virginia lost 13 people and damaged conservatively were estimated at \$15 million. In addition to tidal flooding, much damage was caused to roofs, communication lines, and other structures by the high wind. | | Greater Richmond, Charles City, New Kent | 4 | | 15,000,000 | 11 |
| 8/12-13/1955 | Hurricane (flood) | Hurricane Connie. Richmond 8.85 inches of rain. | | Hanover, City of Richmond | | | | 11 |
| 8/17-18/1955 | Hurricane (flood) | Hurricane Diane moved across central Virginia, Richmond and Washington, D.C. Rain from the two storms set records for the month of August over central and northern Virginia and caused flooding from Virginia through Pennsylvania. | | City of Richmond | | | | 11 |
| 9/19-20/1955 | Hurricane | Hurricane Ione. Richmond experienced gusts of 42 mph. Richmond and southeast Virginia had another 3 to 4 inches of rain. | | City of Richmond | | | | 11 |
| 7/1/1956 | Flood | No detail available. | | Hanover | | | | 1 |
| 7/20/1956 | Tornado | Two F1s reported | | Henrico, City of Richmond | 0 | 0 | 250,000 | 7 |
| 8/5/1956 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 8/19/1956 | Thunderstorm Winds | No detail available. | | Powhatan, Henrico | 0 | 0 | - | 7 |
| 6/28/1957 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 5/7/1959 | Tornado | No detail available. | | Hanover | 0 | 0 | 2,500 | 7 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|----------------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 3/22/1960 | Wind | No detail available. | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | | | 275,590 | 13 |
| 5/17/1960 | Hail | Magnitude: 1 inch diameter hail | | Hanover | 0 | 0 | - | 7 |
| 5/30/1960 | Hail | Magnitude: 1 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 7/26/1960 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 8/4/1960 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 8/6/1960 | Severe Storm/Thunder Storm | No detail available. | | City of Richmond | 0 | 0 | 50,000 | 13 |
| 9/12/1960 | Hurricane | Hurricane Donna - Donna produced rainfall of up to 3 inches over Richmond and up to Washington, DC. There were 3 deaths in the state. | | City of Richmond | | | | 11 |
| 10/21/1961 | Severe Storm/Thunder Storm | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 2,846 | 13 |
| 3/1/1962 | Winter Storm | "Ash Wednesday" storm in March, 1962. It was the biggest storm in a decade and it packed quite a wallop to the western portions of the Commonwealth. Unlike most big winter storms that move up the coast, this storm took a more inland track across Richmond and the Chesapeake Bay. It brought rain and some high winds to Southeast Virginia and heavy snow and blizzard conditions over portions of the north and west. A foot to a foot and a half of snow fell along the foothills to the Blue Ridge with two feet to the west. Extreme Southwest Virginia saw 30 to 42 inches of snow from the storm (the most snow in over 25 years). | | Statewide | | | 16,000,000 | 8 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|---------------------------------|----------------------------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| 3/1/1962 Winter storm continued | | Some roofs collapsed under the weight of the snow. Winds produced blizzard conditions over portions of the west with snow drifts up to 12 feet! Interstates were shut down. Shelters were opened for nearly 4000 stranded travelers and those that left without heat and electricity. Virginia called out its National Guard to help with emergency transports and critical snow removal. Eleven people died in Virginia during and immediately following the storm from over-exertion and heart attacks shoveling snow or from exposure and hypothermia. Snow removal and clean-up costs were estimated at 16 million dollars. | | | | | | |
| 3/6-8/1962 | Flood | Flooding and high waves along entire Atlantic seaboard. Maximum flood height was 7.4 feet in Hampton Roads. | | Charles City, New Kent | | | | 1 |
| 5/8/1962 | Tornado | F2 reported. | | Goochland | 1 | 2 | 250 | 7 |
| 5/8/1962 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 11/29/1962 | Coastal, Wind | No detail available. | | Charles City | 0 | 0 | 20,000 | 13 |
| 9/13/1964 | Hurricane/Tropical Storm | No detail available. | | Charles City | 0 | 0 | 3,000 | 13 |
| 2/13/1966 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 3/7/1967 | Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0.07 | 28,000 | 13 |
| 3/16/1967 | Lightning, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0.14 | 28,000 | 13 |
| 5/7/1967 | Lightning, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 5/15/1967 | Lightning, Thunderstorm Winds | No detail available. | | Goochland, Hanover, Powhatan | 0 | 0 | 18 | 7, 13 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|---|--|--------------------------|---|--------|----------|---------------------|-------------|
| 7/4/1967 | Hail, Wind | No detail available. | | Hanover | 0 | 0 | 51,000 | 13 |
| 12/3/1967 | Wind | No detail available. | | Henrico, City of Richmond | 0 | 4 | 50,000 | 13 |
| 8/19/1968 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 11/12/1968 | Coastal, Severe Storm/Thunder Storm, Wind, Winter Weather | No detail available. | | Charles City, New Kent | 0 | 0 | 15,000 | 13 |
| 3/24/1969 | Tornado | F2 reported. | | City of Richmond | 0 | 1 | 250,000 | 7, 13 |
| 4/19/1969 | Hail | Magnitude: 1 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 6/18/1969 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 6/18/1969 | Hail | Magnitude: 1.12 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 7/23/1969 | Coastal, Severe Storm/Thunder Storm | No detail available. | | Hanover, Henrico | 0 | 0 | 667,000 | 13 |
| 7/28/1969 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 8/9/1969 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 8/9/1969 | Hail | Magnitude: 2 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 8/20/1969 | Hurricane (flood) | Hurricane Camille. Major flooding followed as the bulge of water moved down the James River into Richmond. Statewide damage was estimated at 113 million dollars (1969 dollars). | Yes | Charles City; Hanover, Henrico, Powhatan, New Kent; City of Richmond | 0 | 0 | 113,000,000 | 11, 13 |
| 8/26/1969 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 12/26/1969 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 2,000 | 13 |
| 4/2/1970 | Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 5/20/1970 | Thunderstorm Winds | No detail available. | | Powhatan | 0 | 0 | - | 7 |
| 6/21/1970 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 6/25/1970 | Thunderstorm Winds | No detail available. | | Goochland | 0 | 0 | - | 7 |
| 8/19/1970 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 1/26/1971 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 6/21/1972 | Tropical Storm (flood) | Tropical Storm/Hurricane Agnes. Agnes produced devastating floods in Pennsylvania, Maryland, and Virginia. Richmond was hard hit. The water supply and sewage treatment plants were inundated. Electric and gas plants were flooded. The James River crested at a record high in Richmond. Only one of the five bridges crossing the James was usable and the downtown section was closed for several days. Industry and businesses suffered immense damage. Sixteen people died in Virginia and damage was estimated at \$222 million (1972 dollars). Sixty-three counties and 23 cities in the commonwealth qualified for disaster relief. | Yes | Hanover, Henrico, Powhatan, City of Richmond | 0 | 0 | 222,000,000 | 1, 11, 13 |
| 9/21/1972 | Flooding | No detail available. | | Charles City | 0.06 | 0 | 28,000 | 13 |
| 10/1/1972 | Flood | No detail available. | | Henrico, Powhatan | | | | 1 |
| 10/7/1972 | Flooding, Severe Storm/Thunder Storm | No detail available. | | Goochland, Hanover, Powhatan, City of Richmond | 1.4 | 0 | 1,176,000 | 13 |
| 6/16/1973 | Tornado | F0 reported. | | Henrico | 0 | 0 | 30 | 7 |
| 10/1/1973 | Flood | No detail available. | | Hanover, Powhatan | | | | 1 |
| 2/22/1974 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 2/23/1974 | Wind | No detail available. | | Charles City | 0 | 0 | 3,000 | 13 |
| 6/23/1974 | Hail, Severe Storm/Thunder Storm | No detail available. | | Charles City | 0 | 0 | 3,000 | 13 |
| 8/26/1974 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 8/26/1974 | Hail | Magnitude: 0.75 inch diameter hail | | Henrico | 0 | 0 | - | 7 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|---|----------------------|--------------------------|---|--------|----------|---------------------|-------------|
| 8/29/1974 | Severe Storm/Thunder Storm | No detail available. | | Charles City, Goochland, Hanover, Henrico, New Kent, Powhatan | 0 | 0 | 9,000 | 13 |
| 3/24/1975 | Thunderstorm Winds | No detail available. | | Hanover | 0 | 0 | - | 7 |
| 4/3/1975 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.07 | 0 | 263,000 | 13 |
| 5/23/1975 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 9/1/1975 | Flood | No detail available. | | Goochland; Hanover; Henrico; Powhatan; City of Richmond | 0.3 | 0 | 8 | 1, 13 |
| 9/22/1975 | Flooding, Severe Storm/Thunder Storm | No detail available. | | Goochland, Hanover, Henrico, Powhatan, City of Richmond | 0 | 0 | 544,000 | 13 |
| 2/2/1976 | Wind, Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 3/21/1976 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 6/1/1976 | Hail, Lightning, Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 7/6/1976 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 7/15/1976 | Thunderstorm Winds | No detail available. | | Goochland; Henrico | 0 | 0 | - | 7 |
| 7/15/1976 | Lightning, Wind | No detail available. | | Charles City, New Kent | 0 | 0 | 3,000 | 13 |
| 7/24/1976 | Thunderstorm Winds | No detail available. | | Powhatan | 0 | 0 | - | 7 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|--------------|--|--|--------------------------|---|--------|----------|---------------------|-------------|
| 7/28/1976 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 3/23/1977 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 5/7/1977 | Hail | Magnitude: 1 inch hail | | City of Richmond | 0 | 0 | - | 7 |
| 6/6/1977 | Hail, Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City, Henrico, Powhatan, New Kent, City of Richmond | 0.75 | 0.4 | 29,000 | 13 |
| 7/7/1977 | Hail, Wind | No detail available. | | Charles City, Hanover, Henrico, New Kent, City of Richmond | 0 | 0 | 5,000 | 13 |
| 7/9/1977 | Tornado | No detail available. | | Goochland | 0 | 0 | 250,000 | 7, 13 |
| 7/9/1977 | Hail, Lightning, Wind | No detail available. | | Goochland | 0 | 0 | 28,000 | 13 |
| 7/21/1977 | Lightning, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 10/30/1977 | Coastal, Wind | No detail available. | | Charles City, Henrico, City of Richmond | 0 | 0 | 6,000 | 13 |
| 1/19-20/1978 | Winter Storm | A strong nor'easter developed off the Southeast Coast. It was the third snow in a week for Virginia. East of the mountains saw 4 to 8 inches until you reached Richmond. Richmond got a devastating ice storm causing major power disruptions and tree damage. Many small buildings and roofs collapsed from the weight of the snow in the west. One man was injured when a roof fell. One person died while shoveling snow. | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | 1 | 1 | 26,000 | 8, 13 |
| 1/26/1978 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0.07 | 26,000 | 13 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--|---------------------------------|--------------------------|---|--------|----------|---------------------|-------------|
| 1/28/1978 | Flooding | No detail available. | | Charles City, Goochland, Hanover, Henrico, New Kent, Powhatan, City of Richmond | 0 | 0 | 28,000 | 13 |
| 4/1/1978 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 4/27/1978 | Flooding, Severe Storm/Thunder Storm, Wind, Winter Weather | No detail available. | | Powhatan | 0 | 0 | 94,000 | 13 |
| 6/3/1978 | Wind | No detail available. | | Charles City, Henrico, City of Richmond | 0 | 0 | 6,000 | 13 |
| 6/22/1978 | Hail, Lightning, Severe Storm/Thunder Storm, Wind | No detail available. | | Powhatan | 0 | 0 | 3,000 | 13 |
| 7/3/1978 | Severe Storm/Thunder Storm, Wind | No detail available. | | Powhatan | 0 | 0 | 1,000 | 13 |
| 8/25/1978 | Hail | Magnitude: 1 inch diameter hail | | Hanover | 0 | 0 | - | 7 |
| 1/21/1979 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.21 | 1.54 | 263,000 | 13 |
| 1/25/1979 | Winter Weather | No detail available. | | Charles City, Henrico, Powhatan, New Kent, City of Richmond | 0.05 | 0 | 3,000 | 13 |
| 2/7/1979 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.07 | 0.42 | 3,000 | 13 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|--------------|--------------------------------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| 2/18-19/1979 | Winter Storm | The Presidents Day Storm was considered the worst storm in 57 years to strike Northern Virginia. Snow depths from the storm ranged from 6 to 8 inches southwest and southeast, 8 to 14 inches in the piedmont from south-central Virginia through central Virginia (Richmond reported 11 inches), and up to 20 inches over Northern Virginia. At times, snow was falling 2 to 3 inches per hour and temperatures were in the single digits to teens. Four deaths were attributed to heart attacks from stress due to overexertion during and after the storm, and 18 injuries occurred from falls on ice. Temperatures across the state were very cold (single digits in the north) when the snow began making the storm similar to the February 1899 storm. Even Norfolk got 7 inches before changing to rain and recorded nearly 13 inches of snow for the month. | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | | | 26,000 | 8, 13 |
| 2/23/1979 | Flooding, Severe Storm/Thunder Storm | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.07 | 0 | 263,000 | 13 |
| 8/2/1979 | Lightning | No detail available. | | Hanover | 0 | 0 | 1,000 | 13 |
| 8/27/1979 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 9/6/1979 | Hurricane/Tropical Storm | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.07 | 1.26 | 266,000 | 13 |
| 9/30/1979 | Flooding, Severe Storm/Thunder Storm | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 6,000 | 13 |
| 11/26/1979 | Thunderstorm Winds | No detail available. | | City of Richmond | 0 | 0 | - | 7 |
| 4/27/1980 | Thunderstorm Winds | No detail available. | | Hanover | 0 | 0 | - | 7 |
| 4/27/1980 | Hail | Magnitude: 1 inch diameter hail | | Powhatan | 0 | 0 | - | 7 |
| 4/27/1980 | Hail | Magnitude: 2 inch diameter hail | | Hanover | 0 | 0 | - | 7 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|---|------------------------------------|--------------------------|---|--------|----------|---------------------|-------------|
| 4/27/1980 | Hail | Magnitude: 1-1.75 inch hail | | City of Richmond | 0 | 0 | - | 7 |
| 4/27/1980 | Tornado | F0 reported. | | City of Richmond | 0 | 0 | - | 7 |
| 4/27/1980 | Hail, Severe Storm/Thunder Storm, Wind | No detail available. | | Hanover, Henrico | 0 | 0 | 367,000 | 13 |
| 6/29/1980 | Lightning, Wind | No detail available. | | Goochland; Hanover; Henrico; Powhatan; City of Richmond | 0 | 0 | 6 | 7, 13 |
| 7/5/1980 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.07 | 0.07 | 26,000 | 13 |
| 7/12/1980 | Thunderstorm Winds | No detail available. | | Hanover, Powhatan | 0 | 0 | - | 7 |
| 7/17/1980 | Hail, Lightning, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 28,000 | 13 |
| 8/3/1980 | Thunderstorm Winds | No detail available. | | Goochland | 0 | 0 | - | 7 |
| 8/5/1980 | Hail | Magnitude: .75 inch hail | | City of Richmond | 0 | 0 | - | 7 |
| 8/15/1980 | Lightning, Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City, New Kent | 0 | 0 | 6,000 | 13 |
| 9/14/1980 | Thunderstorm Winds | No detail available. | | City of Richmond | 0 | 0 | - | 7 |
| 5/15/1981 | Hail | Magnitude: 0.75 inch diameter hail | | New Kent | 0 | 0 | - | 7 |
| 6/17/1981 | Hail | Magnitude: 1.75 inch hail | | City of Richmond | 0 | 0 | - | 7 |
| 6/17/1981 | Thunderstorm Winds | No detail available. | | City of Richmond | 0 | 0 | - | 7 |
| 6/21/1981 | Wind | No detail available. | | Goochland, Hanover, Henrico, Powhatan, City of Richmond | | | 6,000 | 13 |
| 7/26/1981 | Lightning, Wind | No detail available. | | Goochland; Hanover; Henrico; Powhatan; City of Richmond | 0 | 0 | 7 | 7, 13 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|--------------|---|--|--------------------------|---|--------|----------|---------------------|-------------|
| 7/28/1981 | Hail, Lightning, Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0.07 | 3,000 | 13 |
| 1/9/1982 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.14 | 1.05 | 3,000 | 13 |
| 4/4/1982 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 52,000 | 13 |
| 7/12/1982 | Thunderstorm Winds | No detail available. | | City of Richmond | 0 | 0 | - | 7 |
| 7/14/1982 | Lightning | No detail available. | | Henrico | 0 | 0 | 50,000 | 13 |
| 7/28/1982 | Hail, Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 12/11/1982 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.07 | 0 | 3,000 | 13 |
| 2/10-11/1983 | Winter Storm | The "Blizzard of '83" beat the Presidents Day Storm. It covered an unusually large area of Virginia with more than a foot of snow. The storm set a new 24 hour snowfall record in Lynchburg with 14.6 inches, Roanoke with 18.6 inches and Richmond with 16.8 inches. Richmond received 18 inches total and parts of Northern Virginia measured as much as 30 inches on the ground. Winds gusted over 25 mph all day on February 11 in the Richmond area causing three foot high drifts. This was the third heaviest snowfall on record for Richmond for the last 100 years. The cost of clearing the snow from state roads came to \$9 million. | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | | | 9,000,000 | 8, 13 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|----------------------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 5/22/1983 | Thunderstorm Winds | No detail available. | | Hanover | 0 | 0 | - | 7 |
| 7/4/1983 | Thunderstorm Winds | No detail available. | | Goochland | 0 | 0 | - | 7 |
| 7/21/1983 | Thunderstorm Winds | No detail available. | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | 0 | 0 | 3,000 | 7, 13 |
| 8/5/1983 | Thunderstorm Winds | No detail available. | | Charles City; New Kent | 0 | 0 | 3,000 | 7, 13 |
| 8/9/1983 | Thunderstorm Winds | No detail available. | | City of Richmond; Hanover; New Kent | 0 | 0 | - | 7 |
| 8/22/1983 | Thunderstorm Winds | No detail available. | | City of Richmond; Goochland; Henrico | 0 | 0 | - | 7 |
| 8/22/1983 | Hail, Lightning, Wind | Magnitude: 1 inch diameter hail | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | 0 | 1 | 5 | 7, 13 |
| 8/23/1983 | Hail, Lightning, Wind | No detail available. | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | 0 | 0 | 5 | 7, 13 |
| 10/13/1983 | Tornado | The first tornado (F1) occurred at 4 p.m. in Goochland County (central Virginia). It tracked 25 miles into Louisa County. A few buildings and trees were destroyed or damaged. | | Goochland | 0 | 0 | 25,000 | 7, 12, 13 |
| 10/13/1983 | Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 26,000 | 13 |
| 11/25/1983 | Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City | 0 | 0 | 3,000 | 13 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|--|--|--------------------------|---|--------|----------|---------------------|-------------|
| 12/24/1983 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.28 | 0.28 | 257,000 | 13 |
| 3/30/1984 | Severe Storm/Thunder Storm, Wind, Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 26,000 | 13 |
| 4/5/1984 | Hail | Magnitude: 0.75 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 4/13/1984 | Hail | Magnitude: 0.75 inch diameter hail | | Powhatan | 0 | 0 | - | 7 |
| 5/8/1984 | Tornado | Severe thunderstorms marched across the state from east of the Blue Ridge to the coast spawning tornadoes and producing significant downburst wind damage. At 4:25 pm a strong (F3) tornado tracked 5 miles through Hopewell causing extensive damage across the city to buildings and trees. A hospital, chemical plants, and various structures were damaged. The Seaboard Coast Line Railway Office was demolished. Fifteen people were injured in Hopewell. It crossed the James River into Charles City County adding another 15 miles to its damage path. It's maximum strength was F2 here and its was about 300 yards wide. Severe downburst winds accompanied the storms leaving a total damage path 10 miles wide. At least a thousand trees were lost. The storm continued east. In New Kent, a barn and out buildings were damaged and a boy was injured by a falling tree. In James City County, 3 mobile homes were destroyed. Statewide damages were around \$50 Million dollars. | | Charles City, New Kent | | 1 | 500,000 | 12, 13 |
| 5/8/1984 | Thunderstorm Winds | No detail available. | | Goochland; Hanover; New Kent | 0 | 1 | - | 7 |
| 6/3/1984 | Thunderstorm Winds | No detail available. | | New Kent | 0 | 0 | - | 7 |
| 7/11/1984 | Thunderstorm Winds | No detail available. | | City of Richmond; Henrico | 0 | 0 | - | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 1/20/1985 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 2/6/1985 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 3/29/1985 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 3/29/1985 | Hail | Magnitude: 1 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 3/30/1985 | Hail, Wind | No detail available. | | Henrico, New Kent | 0 | 0 | 25,000 | 13 |
| 4/10/1985 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 30,000 | 13 |
| 6/5/1985 | Thunderstorm Winds | No detail available. | | Hanover | 0 | 0 | - | 7 |
| 6/5/1985 | Hail | Magnitude: 0.88 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 7/9/1985 | Hail | Magnitude: 0.75 inch diameter hail | | Hanover, Henrico | 0 | 0 | 50 | 7, 13 |
| 7/25/1985 | Tornado | Hurricane Bob Near Manikin in Goochland County at 1230 pm EDT, a F0 tornado was witnessed. It briefly touched down falling a large oak tree. At 118 pm, a second short-lived F0 tornado was reported in Hanover County near Holly Hills. | | Hanover, Goochland | | | | 11 |
| 7/25/1985 | Tornado | F0 reported. | | Goochland, Hanover | 0 | 0 | 250 | 7 |
| 9/27/1985 | Hurricane/Tropical Storm | No detail available. | | Charles City, New Kent, Hanover | 0 | 0 | 43,000 | 13 |
| 11/4/1985 | Flooding, Wind | No detail available. | | Charles City | 0.07 | 0.1 | 167,000 | 13 |
| 6/2/1986 | Hail | Magnitude: 1 inch diameter hail | | Goochland | 0 | 0 | - | 7 |
| 6/20/1986 | Hail | Magnitude: 0.75 inch diameter hail | | Hanover | 0 | 0 | - | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|--------------------------|----------------------|--------------------------|---|--------|----------|---------------------|-------------|
| 6/20/1986 | Drought | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 2,574,000 | 13 |
| 7/9/1986 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 7/19/1986 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 7/22/1986 | Lightning | No detail available. | | Henrico | 0 | 0 | 50,000 | 13 |
| 7/25/1986 | Lightning | No detail available. | | Hanover | 0 | 0 | 25,000 | 13 |
| 8/2/1986 | Thunderstorm Winds | No detail available. | | Goochland | 0 | 0 | - | 7 |
| 8/9/1986 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 8/17/1986 | Hurricane/Tropical Storm | No detail available. | | Charles City | 0 | 0 | 21,000 | 13 |
| 10/14/1986 | Tornado | No detail available. | | Charles City | 0 | 0 | 50,000 | 13 |
| 1/1/1987 | Wind | No detail available. | | Charles City | 0 | 0 | 11,000 | 13 |
| 4/15/1987 | Flooding | No detail available. | | Goochland, Hanover, Henrico, New Kent, Powhatan, City of Richmond | 0.18 | 0.36 | 28,000 | 13 |
| 4/23/1987 | Flooding | No detail available. | | Goochland, Hanover, Henrico, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 5/3/1987 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 5/18/1987 | Lightning | No detail available. | | Henrico | 0 | 0 | 5,000 | 13 |
| 5/31/1987 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 6/3/1987 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 7/18/1987 | Heat | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 7/26/1987 | Tornado | F0 reported. | | Powhatan | 0 | 0 | - | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|----------------------------------|------------------------------------|--------------------------|---|--------|----------|---------------------|-------------|
| 9/5/1987 | Flooding | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 418,000 | 13 |
| 1/22/1987 | Winter Weather | No detail available. | | Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0.06 | 0 | 3,000 | 13 |
| 1/25/1987 | Winter Weather | No detail available. | | Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 2/16/1987 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 2/22/1987 | Winter Weather | No detail available. | | Goochland, Hanover | 0 | 0 | 31,000 | 13 |
| 5/21/1988 | Hail, Severe Storm/Thunder Storm | No detail available. | | Hanover | 0 | 0 | 50,000 | 7, 13 |
| 7/9/1988 | Severe Storm/Thunder Storm, Wind | No detail available. | | Henrico | 0 | 0 | 500,000 | 13 |
| 7/18/1988 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 8/15/1988 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 8/15/1988 | Hail | Magnitude: 0.75 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 8/18/1988 | Thunderstorm Winds | No detail available. | | Powhatan | 0 | 0 | - | 7 |
| 12/28/1988 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0.49 | 30,000 | 13 |
| 3/18/1989 | Thunderstorm Winds | No detail available. | | Hanover, Henrico | 0 | 0 | - | 7 |
| 3/31/1989 | Hail | Magnitude: 0.75 inch diameter hail | | New Kent | 0 | 0 | - | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|----------------------------------|------------------------------------|--------------------------|---|--------|----------|---------------------|-------------|
| 5/5/1989 | Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | 0 | 0 | 257,000 | 7, 13 |
| 5/6/1989 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 6/2/1989 | Thunderstorm Winds | No detail available. | | Goochland; Henrico; New Kent | 0 | 0 | - | 7 |
| 6/15/1989 | Thunderstorm Winds | No detail available. | | Henrico, Powhatan | 0 | 0 | - | 7 |
| 6/16/1989 | Tornado | F1 reported. | | Goochland, Hanover, Henrico, New Kent, Powhatan | 0 | 0 | 2,500 | 7, 13 |
| 6/16/1989 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7, 13 |
| 8/29/1989 | Lightning | No detail available. | | Henrico | 0 | 0 | 50,000 | 13 |
| 9/16/1989 | Hail | Magnitude: 1.75 inch diameter hail | | Powhatan | 0 | 0 | - | 7 |
| 9/23/1989 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 14 | - | 7 |
| 11/16/1989 | Thunderstorm Winds | No detail available. | | Goochland, Hanover | 0 | 0 | - | 7 |
| 11/20/1989 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 26,000 | 13 |
| 11/22/1989 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 0 | 13 |
| 2/26/1990 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 4/2/1990 | Hail | Magnitude: 1 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 4/2/1990 | Hail | Magnitude: 1.75 inch diameter hail | | Goochland | 0 | 0 | - | 7 |
| 4/2/1990 | Hail | Magnitude: 2 inch diameter hail | | Powhatan | 0 | 0 | - | 7 |
| 6/1/1990 | Drought | No detail available. | | Powhatan | 0 | 0 | 50,000 | 13 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|--|------------------------------------|--------------------------|---|--------|----------|---------------------|-------------|
| 6/18/1990 | Thunderstorm Winds | No detail available. | | Goochland; Hanover; Henrico | 0 | 0 | - | 7 |
| 6/22/1990 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 6/30/1990 | Hail | Magnitude: 0.75 inch diameter hail | | Goochland | 0 | 0 | - | 7 |
| 7/1/1990 | Thunderstorm Winds | No detail available. | | Hanover, Henrico | 0 | 0 | - | 7 |
| 7/1/1990 | Hail | Magnitude: 1 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 7/21/1990 | Thunderstorm Winds | No detail available. | | Henrico, New Kent | 0 | 0 | - | 7 |
| 9/7/1990 | Thunderstorm Winds | No detail available. | | Hanover | 0 | 0 | - | 7 |
| 10/13/1990 | Flooding | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0.07 | 3,000 | 13 |
| 12/27/1990 | Severe Storm/Thunder Storm, Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 3,000 | 13 |
| 3/1/1991 | Drought | No detail available. | | Goochland, Hanover | 0 | 0 | 8,622,000 | 13 |
| 8/4/1991 | Thunderstorm Winds | No detail available. | | Goochland | 0 | 0 | - | 7 |
| 8/19/1991 | Thunderstorm Winds | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 1/4/1992 | Coastal, Flooding, Wind | No detail available. | | Charles City, New Kent | 0 | 0 | 4,000 | 13 |
| 1/14/1992 | Wind | No detail available. | | Charles City, New Kent | 0 | 0.02 | 1,000 | 13 |
| 4/25/1992 | Flooding | No detail available. | | City of Richmond | 0 | 0 | 5,000 | 13 |
| 6/16/1992 | Wind | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0.63 | 26,000 | 13 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|--------------|--------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 3/13-14/1993 | Winter Storm | The "Superstorm of March '93" was also known as "The Storm of the Century" for the eastern United States, due to its large area of impact, all the way from Florida and Alabama through New England. The storm was blamed for some 200 deaths and cost a couple billion dollar to repair damages and remove snow. In Florida, it produced a storm surge of 9 to 12 feet that killed 11 people (more deaths than storm surges Hurricanes Hugo and Andrew combined) and it spawned 11 tornadoes. In a large swath from Alabama to New England, it dropped over a foot of snow. As the storm's center crossed Virginia, weather stations recorded their lowest pressure ever. | Yes | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | | | 19,000 | 8, 13 |
| 3/14/1993 | Wind | No detail available. | | Hanover | 0 | 0 | 2,000 | 13 |
| 5/31/1993 | Thunderstorm Winds | Thunderstorm winds knocked down trees in the western part of the County. | | Goochland | 0 | 0 | 500 | 7 |
| 8/6/1993 | Tornado | A weak tornado touched down 3 miles northeast of Providence Forge and moved northeast to 4 miles southeast of the town of New Kent. The tornado traveled through mostly wooded area knocking down numerous trees but doing very little damage to property otherwise. | | Charles City, New Kent | 0 | 0 | 5,000 | 7 |
| 8/31/1993 | Drought | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 2,632,000 | 13 |
| 11/28/1993 | Flooding | No detail available. | | Goochland, Hanover, Henrico, Powhatan, City of Richmond | 0 | 0 | 6,000 | 13 |
| 11/27/1993 | Thunderstorm Winds | Strong thunderstorm winds downed trees and power lines. | | Henrico | 0 | 0 | 500 | 7 |
| 11/30/1993 | Flooding | No detail available. | | Henrico, City of Richmond | 0 | 0 | 83,000 | 13 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-------------|---------------------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| 12/5/1993 | High Winds | A rapidly intensifying low pressure system and associated cold front raced through Virginia during the morning of December 5. Very strong gradient winds developed behind the system and affected much of the western two-thirds of the state during the morning and early afternoon. Numerous trees and powerlines were knocked down where sustained winds were highest. | | Powhatan | 0 | 0 | 5,000 | 7 |
| 12/28/1993 | Winter Storm | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan | 0 | 0 | - | 7 |
| 12/28/1993 | Winter Weather/Heavy Snow | No detail available. | | Goochland, Hanover, Henrico, New Kent, Powhatan | 0 | 0 | - | 7 |
| 1/20/1994 | Winter Weather | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | | 283,000 | 13 |
| February-94 | Winter Storm | These two months saw an unusual assault of ice storms on the Commonwealth. It began in mid January with an arctic blast that sent temperatures below zero over northern and western Virginia for a couple mornings. Winchester recorded -18°F on the 16th, Harrisonburg reached -13°F, Woodstock was -17°F and western Loudoun County reached -15°F. Between then and mid February, about a dozen storms hit dropping snow, sleet, and freezing rain over all but the southeast. The most devastating storm struck February 10-11. A swath of Virginia was coated with one to three inches of solid ice from freezing rain and sleet! The hardest hit was an area from Danville and Lynchburg northeast through Fredericksburg. | Yes | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan | | | 1,760,000 | 8, 13 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|--------------------------------|--------------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| Feb. 94 winter storm continued | | Some counties lost 10 to 20 percent of their trees from the heavy ice. Roads were blocked and impassable. Electric and phone lines were down with as much as 90 percent of the county's people without power. Even with the help of electric companies from other states, many people were without power for a week. A presidential disaster declaration was given and damages were estimated at \$61 million. There were numerous injuries from automobile accidents and people falling on ice. Unfortunately, the National Weather Service does not keep records on ice amounts because this was likely the iciest winter Virginia has seen, at least this century. | | | | | | |
| 5/15/1994 | Thunderstorm Winds | Thunderstorm winds blew several trees and limbs down in southern Hanover County near Mechanicsville, causing power outages. Up to 250 customers were without power in parts of Dinwiddie, Essex, Gloucester, Hanover, and Henrico Counties. | | Hanover | 0 | 0 | 5,000 | 7 |
| 5/25/1994 | Lightning | At 5:20 pm, a 26 year old male took refuge under a tree on a golf course (Glenwood Springs) in Henrico County. The tree was struck and the lightning killed the man. | | Henrico | 1 | | 5,000 | 6, 7 |
| 6/16/1994 | High Winds | Trees downed. | | Hanover | 0 | 0 | - | 7 |
| 6/27/1994 | High Winds | Trees down along Route 5 in the eastern end of New Kent County. | | New Kent | 0 | 0 | - | 7 |
| 6/27/1994 | High Winds | Trees and limbs downed on John Tyler Highway two miles west of Route 2 E 618. Downed trees are the probable cause of an accident on that road. Reports of trees uprooted and damaged. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan | 0 | 0 | - | 7 |
| 6/29/1994 | High Winds | A tree fell on a occupied vehicle at Routes 249 and 106. A tree was blocking Route 249 just west of Route 33. Also, part of a tree was blocking one lane of Route 618. | | New Kent | 0 | 0 | - | 7 |
| 9/22/1994 | High Winds | No detail available. | | Hanover, Henrico | 0 | 0 | 5,000 | 7 |
| 1/17/1995 | Flood | The James River crested at 13 feet, four feet above flood stage. Minor flooding was noted, with only \$150 in damage reported. | | Henrico | 0 | 0 | 150 | 7 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|---|--------------------------|---------------------------------------|--------|----------|---------------------|-------------|
| 1/30/1995 | Heavy Snow | No detail available. | | Goochland, Hanover, Powhatan | 0 | 0 | - | 7 |
| 3/8/1995 | Wind | No detail available. | | Henrico | 0 | 0 | 25,000 | 13 |
| 5/18/1995 | Thunderstorm Winds | Large tree limbs down near Royal Virginia Golf Course. | | Goochland | 0 | 0 | - | 7 |
| 5/25/1995 | Thunderstorm Winds | Trees and utility pole down on Route 658. Trees down. | | Charles City, New Kent | 0 | 0 | - | 7 |
| 5/29/1995 | Hail | Marble-size hail reported in Goochland County. In Hanover County, one-inch hail reported by off-duty National Weather Service personnel. Golfball-size hail and possible funnel cloud reported by resident. | | Goochland, Hanover | 0 | 0 | - | 7 |
| 6/11/1995 | Thunderstorm Winds | Tree down across power lines along Route 650 in southeast Goochland County. Large tree down across Flint Hill Road (Powhatan). Power lines down in Ashland (Hanover County). Trees and power lines down western portion of Henrico County. | | Goochland; Hanover; Henrico; Powhatan | 0 | 0 | - | 7 |
| 6/25/1995 | Thunderstorm Winds | Numerous trees down. Power out. Shed destroyed. | | Hanover | 0 | 0 | - | 7 |
| 6/26/1995 | Thunderstorm Winds | Several large trees down in central Hanover County, also in Kings Charter subdivision and along Winns Church Road. | | Hanover | 0 | 0 | - | 7 |
| 6/27/1995 | Flood | Very heavy rainfall caused by slow moving thunderstorms caused small streams and creeks to overflow their banks and lead to the closure of Virginia Route 6 and more than a dozen secondary roads. The rain damaged more than 4,500 acres of crop and pasture | | Goochland | 0 | 0 | 212,000 | 7, 13 |
| 7/6/1995 | Thunderstorm Winds | Thunderstorm winds downed a tree on SR 604 near the Chesterfield County line in eastern Powhatan County. | | Powhatan | 0 | 0 | - | 7 |
| 7/10/1995 | Thunderstorm Winds | Two trees down on Elk Hall Road. Trees down several areas of Powhatan County. A Sheriff's Department vehicle was blown off road by high winds. | | Goochland, Powhatan | 0 | 0 | - | 7 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|--------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 7/10/1995 | Heavy Rain | Scores of large trees downed by high winds along a several mile path. Several inches of water across many low-lying roads in County. Other trees down, roof blown off house near the intersection of Highway 60 and SR 629 in SW Powhatan County. | | Powhatan | 0 | 0 | - | 7 |
| 7/10/1995 | Hail | Quarter-size hail reported. | | Goochland | 0 | 0 | - | 7 |
| 7/10/1995 | Hail | Golf ball-size hail reported. | | Powhatan | 0 | 0 | - | 7 |
| 7/11/1995 | Lightning | Minor damage to a home from lightning ignited fire. | | Powhatan | 0 | 0 | - | 7 |
| 7/21/1995 | Thunderstorm Winds | Two trees down on SR 684. | | Hanover | 0 | 0 | - | 7 |
| 7/27/1995 | Lightning | A lightning related fire caused heavy damage to a two-story house in Hanover County. Lightning set fire to two homes, causing approx \$65K damage to one and \$70K damage to another in Henrico County. Woman received minor injuries when lightning struck her near the front door of her house in Powhatan County. | | Hanover, Henrico, Powhatan | 0 | 1 | 135,000 | 6, 7, 13 |
| 8/31/1995 | Heat | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 0 | 13 |
| 9/1/1995 | Lightning | Power pole/line struck by lightning and set on fire. | | Hanover | 0 | 0 | - | 7 |
| 9/1/1995 | Flood | Significant street flooding reported in many areas of Richmond. Trees were knocked down. Some street were flooding. Three houses were struck by lightning. | | Henrico | 0 | 0 | - | 7 |
| 10/27/1995 | Thunderstorm Winds | Trees uprooted onto car, house and power lines. Tree and large branches down west and northwest of the University of Richmond. Tree and several large branches down. Large limbs down near the intersection of Routes 33/54. Two trees down on Highway 360 East. Two trees down near Sandy Valley Road and SR 634. Several trees and large limbs down, also in the Black Creek area. | | Hanover | 0 | 0 | - | 7 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------------------------------|--------------------|---|--------------------------|--|--------|----------|---------------------|-------------|
| 11/11/1995 | Thunderstorm Winds | Trees were down and power out in several parts of Charles City County. Trees down across central and western parts of Goochland County. Barn destroyed and 20 to 30 trees down in Hanover County. Numerous trees down, several traffic signals damaged and power outages in Henrico County. Trees and power lines down throughout New Kent County. Four trees down along Route 60 about eight miles west of Powhatan. | | Charles City, Hanover, Henrico, New Kent | 0 | 0 | - | 7 |
| 1/6-13/1996 | Winter Storm | The "Blizzard of '96" or the "Great Furlough Storm" began late on Saturday, January 6. Just one day earlier, an impasse between a republican congress and a democratic president over the 1996 Federal Budget had finally come to an end. Many federal employees had been on furlough with government offices shut down for almost a month. Employees would finally return to work on Monday, January 8. However, mother nature did not cooperate. By Monday morning, much of Virginia and the Washington area was buried under 2 feet of snow. Around Richmond and throughout central Virginia 1 to 2 feet of snow fell with 11 to 14 inches in the immediate metro area. Even the Tidewater area saw anywhere from 5 to 8 inches of snow. | Yes | Greater Richmond | | | | 8 |
| 1/6-13/1996 winter storm continued | | The entire I-95 corridor from near the North Carolina border into New England was paralyzed. Many rural and some residential areas did not see a snow plow for 5 days. The Federal Government remained shut down for another 4 days. Many local governments and businesses were also closed. Schools announced their closure for the entire week and some were closed longer. A second storm struck on Friday, January 12 dumping another 2 to 6 inches. A maximum of 10 inches of snow fell over Highland and western Loudoun Counties. By the week's end, most of Virginia, west of Richmond, had seen 2 to 4 feet of snow! Most areas to the east had received at least a foot. | | | | | | |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 1/6/1996 | Winter Storm | No detail available. | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | 0 | 0 | 115,000 | 7, 13 |
| 1/11/1996 | Heavy Snow | The second storm in less than a week dumped locally heavy snow again on portions of central and east central Virginia. Further south and southeast, the precipitation was somewhat lighter, and more in the form of sleet and freezing rain. | | Goochland, Hanover, Henrico, City of Richmond | 0 | 0 | - | 7 |
| 1/19/1996 | Thunderstorm Winds | Numerous trees and power lines down...most in eastern part of Goochland County. Large tree down near Beaver Dam (Hanover County) and numerous trees and power lines down. Many trees down...some across roads in Henrico County. Trees and power lines down in New Kent and Powhatan Counties. | | Goochland; Hanover; Henrico; New Kent; Powhatan | 0 | 0 | - | 7 |
| 2/2/1996 | Winter Storm | A winter storm tracked northeast from the Gulf Coast states to off the Virginia coast. It spread heavy snow across portions of the Northern Neck, Middle Peninsula, and Central Piedmont of Virginia from early Friday morning into Saturday afternoon. | | Goochland, Hanover, Henrico, City of Richmond | 0 | 0 | - | 7 |
| 2/16/1996 | Winter storm | On the 16th, another nor'easter moved up the coast dumping 6 to 12 inches of snow in a swath across Virginia from Nottoway to Fredericksburg with Charlottesville on the west side of the heavy band and Richmond on the east side. | | Greater Richmond | | | | 8 |
| 2/16/1996 | Winter Storm | A storm tracked northeast from western South Carolina Thursday night to off the North Carolina coast Friday morning, then moved north to off the Massachusetts coast by Friday night. It spread heavy snow across portions of Virginia. | | Charles City, Goochland, Hanover, Henrico, City of Richmond, New Kent, Powhatan | 0 | 0 | - | 7 |
| 3/1/1996 | Winter Storm | A low pressure area tracked northeast from the Gulf of Mexico to off the North Carolina coast. It spread light snow across portions of eastern and central Virginia from the Northern Neck and Middle Peninsula westward into the Piedmont. | | Goochland, Hanover, Henrico, City of Richmond, Powhatan | 0 | 0 | - | 7 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 3/7/1996 | Winter Storm | A low pressure area developed over the Carolinas then tracked northeast off the North Carolina and Virginia coast. It spread light snow across much of central and eastern Virginia from Thursday night through Friday morning. | | Charles City, Goochland, Hanover, Henrico, New Kent, Powhatan, City of Richmond | 0 | 0 | - | 7 |
| 3/19/1996 | Lightning | Lightning strike caused the air traffic control center at Richmond International Airport to lose power for 41 minutes. This power outage caused pilots to land planes on their own. | | Henrico | 0 | 0 | - | 7 |
| 4/23/1996 | Thunderstorm Winds | 60 MPH winds broke off radio antenna 2 blocks from City Hall. Several roofs blown off of an apartment complex on Staples Mill Road near Interstate 64. Trees downed east end of Henrico County. Several trees toppled onto telephone poles and power lines. Tin roof blown off of a Hanover school. Numerous trees and power lines downed in New Kent. | | City of Richmond; Hanover; Henrico | 0 | 0 | - | 7 |
| 4/29/1996 | Thunderstorm Winds | Several large trees downed onto highway. Also, downed power lines caused numerous power outages. | | Powhatan | 0 | 0 | - | 7 |
| 5/11/1996 | Thunderstorm Winds | Approximately 19 trees and numerous power lines blown down in Henrico County. Tops of 5 trees snapped off and 18 inch diameter tree blown onto home. Power lines downed onto roads. Numerous trees downed and blocking roadways in New Kent. Richmond International Airport recorded wind gust of 60 MPH. | | Charles City; Henrico; New Kent | 0 | 0 | 37,000 | 7, 13 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|---|--------------------------|--------------------------------|--------|----------|---------------------|-------------|
| 5/18/1996 | Excessive heat | An early-season four-day heat wave produced record or near record high temperatures across central and eastern Virginia. High temperatures were in the 80s and low 90s across the region on May 18. Then, on May 19, May 20, and May 21, high temperatures were in the 90s throughout the area. May 20 was the hottest of the four days as readings climbed into the mid to upper 90s. Also, Norfolk International Airport set a record with 98 degrees and Farmville (co-op observer station) set a record with 96 degrees. Unfortunately though, the heat wave was responsible for numerous reports of heat exhaustion and forced many non-air conditioned schools to close or have early dismissals. | | Goochland, Hanover, Henrico | | | | 7 |
| 6/4/1996 | Thunderstorm Winds | Several trees downed throughout the County. | | Hanover | 0 | 0 | 3,000 | 7, 13 |
| 6/4/1996 | Hail | Magnitude: 0.75 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 6/24/1996 | Lightning | Lightning strikes caused fires which heavily damaged two apartment buildings at the Westbury Apartments and Townhouses. Eighteen apartments were damaged in the fires and 25 to 30 residents were displaced. | | Henrico | 0 | 0 | 500,000 | 7 |
| 6/24/1996 | Thunderstorm Winds | Numerous trees blown onto power lines in Hanover County. | | Charles City; Hanover; Henrico | 0 | 0 | 15,000 | 7, 13 |
| 6/24/1996 | Hail | Magnitude: .75 inch hail | | City of Richmond | 0 | 0 | - | 7 |
| 6/24/1996 | Thunderstorm Winds | Several trees blown down off Patterson Avenue. | | City of Richmond | 0 | 0 | 3,000 | 7 |
| 6/24/1996 | Lightning | No detail available. | | Henrico | 0 | 0 | 500,000 | 13 |
| 7/3/1996 | Thunderstorm Winds | Numerous trees downed onto Route 60. | | Powhatan | 0 | 0 | 4,000 | 7, 13 |
| 7/3/1996 | Hail | Magnitude: 0.75-1.75 inch diameter hail | | Powhatan | 0 | 0 | - | 7 |
| 7/8/1996 | Thunderstorm Winds | A home's roof was significantly damaged by a large tree crashing through it. | | City of Richmond | 0 | 0 | 10,000 | 7, 13 |
| 7/18/1996 | Thunderstorm Winds | Numerous trees blown down along Route 600. | | New Kent | 0 | 0 | 5,000 | 7, 13 |
| 8/24/1996 | Lightning | Lightning strike caused a fire which damaged a house and its contents in the 12000 block of Robson Street. | | Henrico | 0 | 0 | 100,000 | 7, 13 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|--------------------|--|--------------------------|--------------------------------------|--------|----------|---------------------|-------------|
| 8/24/1996 | Thunderstorm Winds | Several trees blown down across three lanes of Broad Street covering a two block area. Numerous 2-3 foot diameter trees down near the Henrico/Goochland County line in the Lauderdale area. Virginia Power reported several trees blown down on power lines in City of Richmond. | | City of Richmond; Goochland; Henrico | 0 | 0 | 5,000 | 7, 13 |
| 8/24/1996 | Hail | Magnitude: 0.75 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 8/27/1996 | Thunderstorm Winds | Several trees and power lines blown down. Several trees blown down onto Routes 600 and 705. | | Hanover, Henrico, New Kent | 0 | 0 | 8,000 | 7, 13 |
| 9/8/1996 | Thunderstorm Winds | Several trees blown down across power lines at Routes 249 and 155. Numerous trees blown down. Several trees blown down on Route 64. | | Hanover, New Kent | 0 | 0 | 7,000 | 7 |
| 9/8/1996 | Flood | Local police reported Highway 665 (New Kent) was closed due to high water. Four inches of rain fell within five hours in eastern Henrico county causing flooding of roadways and poor drainage areas. This heavy rainfall combined with a 5-foot-deep drainage ditch filled with water contributed to the death and injury of two Richmond sisters. Near the intersection of Yeadon Road and Barrington Road, their vehicle ran into water 2 feet deep. Water seeped inside the vehicle then rushing floodwaters swept them off the road and into the drainage ditch. The vehicle then flipped over onto its top and became submerged. | | Henrico, New Kent | 1 | 1 | 5,000 | 7, 13 |
| 9/8/1996 | Hail | Magnitude: 0.75-1 inch diameter hail | | City of Richmond; Henrico | 0 | 0 | - | 7 |
| 9/8/1996 | Thunderstorm Winds | Cable lines blown down on Midlothian Turnpike. | | City of Richmond | 0 | 0 | 2,000 | 7, 13 |
| 10/18/1996 | Thunderstorm Winds | Several trees blown down near Route 606. Several trees blown down onto Route 600, blocking road. | | Goochland, Hanover | 0 | 0 | 4,000 | 7, 13 |
| 11/8/1996 | Thunderstorm Winds | Several trees blown down onto Route 600, blocking road (Goochland). Several trees blown down near the intersection of Routes 60 and 629 (Powhatan). | | Goochland, Powhatan | 0 | 0 | 5,000 | 7, 13 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 11/8/1996 | Hail | Magnitude: 0.75-.88 inch diameter hail | | City of Richmond; Hanover | 0 | 0 | - | 7 |
| 12/2/1986 | Flooding | No detail available. | | Charles City, Hanover, Henrico, Goochland, New Kent, Powhatan, City of Richmond | 0 | 0 | 5,000 | 13 |
| 12/5/1996 | Thunderstorm Winds | A shed roof was damaged, another shed was blown off its foundation about 100 yards, a pole barn collapsed, and several trees and power lines were blown down. | | Henrico | 0 | 0 | 25,000 | 7, 13 |
| 12/5/1996 | Hail | Magnitude: .88- 1.75 inch diameter hail | | City of Richmond; New Kent | 0 | 0 | - | 7 |
| 1/9/1997 | Snow | Low pressure moved north along the eastern seaboard during Thursday, January 9, and spread 2 to 3 inches of snow across portions of the Central Piedmont and Northern Neck of Virginia. Between 3 and 4 inches of snow was reported at Ashland in Hanover County. | | Goochland, Hanover | 0 | 0 | - | 7 |
| 2/8/1997 | Winter Storm | Low pressure tracked from the Gulf Coast States to off the North Carolina coast during Friday, February 7th and Saturday, February 8th. It spread 2 to 3 inches of snow across portions of the central piedmont eastward to the northern neck of Virginia. While across northern portions of Caroline, Fluvanna, Louisa, and Westmoreland counties, 4 to 5 inches of snow accumulated. | | Goochland, Hanover, Powhatan | 0 | 0 | - | 7 |
| 2/13/1997 | Snow | Low pressure tracked from the Gulf Coast States to off the southeast Virginia coast during Thursday, February 13th and early Friday, February 14th. It spread 1 to 2 inches of snow across portions of the piedmont of central and southcentral Virginia. | | Goochland, Hanover | 0 | 0 | - | 7 |
| 2/21/1997 | Thunderstorm Winds | Two trees uprooted and minor structural damage to a building. | | City of Richmond | 0 | 0 | 7,000 | 7, 13 |
| 5/9/1997 | Thunderstorm Winds | Large tree down on Route 611. | | New Kent | 0 | 0 | 1,000 | 7, 13 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|--------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 6/26/1997 | Thunderstorm Winds | Large tree down along Route 681. | | Powhatan | 0 | 0 | 1,000 | 7, 13 |
| 7/16/1997 | Thunderstorm Winds | Warehouse blown down. Several trees down and retaining wall blown down. Damage to a building and a home. Numerous trees down on wires and roadways. | | City of Richmond; Hanover; Henrico | 0 | 0 | 46,000 | 7,13 |
| 7/16/1997 | Hail | Magnitude: 0.75 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 7/22/1997 | Thunderstorm Winds | Several trees down. | | City of Richmond; Goochland; Hanover | 0 | 0 | 7,000 | 7,13 |
| 8/4/1997 | Hail | Magnitude: 1 inch diameter hail | | Hanover | 0 | 0 | - | 7 |
| 9/30/1997 | Drought | No detail available. | | Charles City, Hanover, Powhatan, New Kent | 0 | 0 | 8,533,000 | 13 |
| 12/29/1997 | Winter Storm | Low pressure tracked from the southeast United States to just off the North Carolina coast during Monday afternoon and night, December 29th. It spread 2 to 3 inches of snow across portions of the piedmont of central and southcentral Virginia. | | Goochland | 0 | 0 | - | 7 |
| 1/27/1998 | Heavy Rain | A Nor'easter produced heavy rain and strong winds across central and eastern Virginia on Tuesday, January 27th and Wednesday, January 28th. Rainfall totals generally ranged from 2 to 4 inches. This rainfall caused street flooding and flooding of poor draining areas. | | City of Richmond; Goochland; Hanover; Henrico; New Kent; Powhatan | 0 | 0 | - | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 2/4/1998 | Heavy Rain | A Nor'easter produced heavy rain and strong winds across central and eastern Virginia from Tuesday, February 3rd through Thursday, February 5th. Rainfall totals generally ranged from 2 to 4 inches across most of the region, with the heaviest amounts (in the 5 to 7.5 inch range) occurring across portions of the Hampton Roads and Virginia Eastern Shore into the Middle Peninsula and Northern Neck. All mainstem rivers in the AKQ HSA reached or exceeded flood stage as a result of this event. However...no major mainstem river flood problems occurred. Heavy rain caused many urban flood/poor drainage flood problems across virtually the entire area. Most jurisdictions had at least a few roads closed due to high water. | | City of Richmond; Goochland; Hanover; Henrico; New Kent; Powhatan | 0 | 0 | - | 7 |
| 2/17/1998 | Hail | Magnitude: 1.5-1.75 inch diameter hail | | Goochland | 0 | 0 | - | 7 |
| 3/9/1998 | Thunderstorm Winds | Apparent microburst downed several trees and severely damaged a barn. In addition, there was minor roof damage to 2 homes and one other barn sustained siding damage. | | Hanover | 0 | 0 | 15,000 | 7, 13 |
| 4/1/1998 | Tornado | F39PH, M1PH | | Hanover | 2 | 0 | 800,000 | 7, 13 |
| 4/9/1998 | Thunderstorm Winds | Several trees down. | | New Kent | 0 | 0 | 2,000 | 7, 13 |
| 4/19/1998 | Thunderstorm Winds | Several trees down on Route 155. | | Charles City, New Kent | 0 | 0 | 2,000 | 7, 13 |
| 5/4/1998 | Hail | Magnitude: 0.75-1 inch diameter hail | | City of Richmond; Goochland; Hanover; Henrico; New Kent | 0 | 0 | - | 7 |
| 6/13/1998 | Thunderstorm Winds | Numerous trees down. | | Henrico, New Kent | 0 | 0 | 5,000 | 7 |
| 6/13/1998 | Hail | Magnitude: 0.75-2 inch diameter hail | | City of Richmond; Hanover; Powhatan | 0 | 0 | - | 7 |
| 6/15/1998 | Thunderstorm Winds | Several trees down. Also, awnings off a few buildings. | | Goochland; Henrico | 0 | 0 | 9,000 | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|---------------|--------------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| 6/15/1998 | Hail | Magnitude: 0.75-1.75 inch diameter hail | | City of Richmond; Goochland; Henrico | 0 | 0 | - | 7 |
| 6/28/1998 | Thunderstorm Winds | Large tree blown down across Route 1. Several trees down in north side of city. | | Charles City; Hanover; Henrico; Goochland; New Kent; Powhatan; City of Richmond | 0 | 0 | 18,000 | 7, 13 |
| 7/10/1998 | Flood | Slow moving thunderstorms produced rainfall amounts between 3.0 and 3.5 inches within 2 hours. This resulted in flash flooding in eastern portions of Hanover county. Several roads were reported under as much as six inches of water. Several accidents were reported. | | Hanover | 0 | 0 | - | 7 |
| 7/22/1998 | Thunderstorm Winds | Several trees down at intersection of Route 60 and Ridge Road. | | Powhatan | 0 | 0 | 4,000 | 7, 13 |
| 9/7/1998 | Thunderstorm Winds | Trees down, siding off a house and a tree fell on a car in a subdivision on top of a hill. | | New Kent | 0 | 0 | 5,000 | 7, 13 |
| 11/30/1998 | Drought | No detail available. | | Goochland, Hanover, Henrico, Powhatan | 0 | 0 | 3,810,000 | 13 |
| 12/23-25/1998 | Ice Storm | A major ice storm affected central and eastern Virginia from Wednesday, December 23rd into Friday, December 25th. A prolonged period of freezing rain and some sleet resulted in ice accumulations of one half inch to one inch in many locations. The heavy ice accumulations on trees and power lines caused widespread power outages across the region. Approximately 400,000 customers were without power during the maximum outage period, Christmas Eve day. Some customers were without power for about ten days. Many accidents occurred due to slippery road conditions, especially bridges and overpasses. Many secondary roads were impassable due to fallen tree limbs and in a few cases, whole trees. | | Charles City, Goochland, Hanover, Henrico, New Kent, Powhatan, City of Richmond | 0 | 0 | 20,000,000 | 7, 13 |
| 1/3/1999 | Dry Microburst | A microburst blew down numerous large trees, demolished a cinder block shed, and caused some shingle damage to a few houses. | | Hanover | 0 | 0 | 30,000 | 7, 13 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 1/8/1999 | Winter Weather | Sleet, freezing rain and freezing drizzle occurred off and on during Friday, January 8th across portions of the piedmont of central Virginia into the Virginia northern neck. This precipitation resulted in ice accumulations on many roads and bridges, and in turn, several accidents were reported. | | Goochland, Hanover, Powhatan | 0 | 0 | - | 7 |
| 1/18/1999 | Thunderstorm Winds | Few trees down on Route 273. | | New Kent | 0 | 0 | 2,000 | 7, 13 |
| 2/12/1999 | Thunderstorm Winds | Several trees down. | | Goochland; Hanover; New Kent | 0 | 0 | 6,000 | 7, 13 |
| 2/12/1999 | Hail | Magnitude: 0.75-1.75 inch diameter hail | | Goochland, Powhatan | 0 | 0 | - | 7 |
| 3/3/1999 | Thunderstorm Winds | Several trees down. | | Henrico | 0 | 0 | 2,000 | 7, 13 |
| 3/9/1999 | Winter Storm | The combination of a weakening storm over the Ohio Valley, and a developing storm off the South Carolina coast produced 2 to 5 inches of snow across portions of the Virginia piedmont eastward into the Virginia northern neck Tuesday afternoon into early morning Wednesday. Beaverdam in Hanover County received 5 inches of snow. | | Hanover | 0 | 0 | - | 7 |
| 4/9/1999 | Thunderstorm Winds | Several trees down. | | City of Richmond; Goochland; Hanover; Henrico; New Kent; Powhatan | 0 | 0 | 10,000 | 7, 13 |
| 4/23/1999 | Thunderstorm Winds | Trees down countywide. | | Hanover, New Kent | 0 | 0 | 6,000 | 7, 13 |
| 4/23/1999 | Hail | Magnitude: 0.75-2 inch diameter hail | | City of Richmond; Goochland; Hanover; Henrico; New Kent | 0 | 0 | - | 7 |
| 5/24/1999 | Thunderstorm Winds | Power lines down near Pole Green. Numerous trees down and damage to a trailer. | | Hanover | 0 | 0 | 11,000 | 7, 13 |
| 6/29/1999 | Thunderstorm Winds | Numerous trees down on Route 605. | | Hanover | 0 | 0 | 3,000 | 7, 13 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|----------------------------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| 7/7/1999 | Thunderstorm Winds | Trees and power lines down countywide. | | Powhatan | 0 | 0 | 2,000 | 7, 13 |
| 7/28/1999 | Thunderstorm Winds | Several trees down. | | Hanover | 0 | 0 | 2,000 | 7, 13 |
| 7/29/1999 | Thunderstorm Winds | Trees and power lines down. | | Goochland, Powhatan | 0 | 0 | 4,000 | 7, 13 |
| 8/1/1999 | Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City | 0 | 0 | 2,000 | 13 |
| 8/26/1999 | Thunderstorm Winds | Trees down near Bells Road and I-95. | | City of Richmond | 0 | 0 | 4,000 | 7, 13 |
| 9/1/1999 | Heavy Rain | Hurricane and Tropical Storm Dennis produced heavy rainfall across central and south central Virginia. The heaviest rain occurred on September 4th and 5th. Most of the area received between 2.5 and 5 inches of rain. However, in Brunswick county, as much as 10.21 inches was recorded in Lawrenceville, and 6.19 inches was recorded in Alberta. | | City of Richmond; Goochland; Hanover; Henrico; New Kent; Powhatan | 0 | 0 | - | 7 |
| 9/9/1999 | Flood | Slow-moving thunderstorms caused flooded roads. This flooding forced people to abandon vehicles. | | Henrico, City of Richmond | 0 | 0 | - | 7 |
| 9/13/1999 | Hurricane (flood) | Very heavy rain from Hurricane Floyd produced widespread flooding and flash flooding across much of central and eastern Virginia, and northeast North Carolina. | Yes | City of Richmond; Hanover; Henrico; New Kent | 0 | 0 | 1,493,000 | 9 |
| 9/16/1999 | Flooding | No detail available. | | Hanover, Henrico, New Kent, City of Richmond | 0 | 0 | 1,493,000 | 13 |
| 9/16/1999 | Wind | No detail available. | | Charles City, Hanover, Henrico, New Kent, City of Richmond | 0 | 0 | 15,000 | 13 |
| 9/30/1999 | Thunderstorm Winds | Numerous trees down. Trees down on vehicles. | | Henrico; City of Richmond | 0 | 0 | 6,000 | 7, 13 |
| 11/11/1999 | Lightning | Lightning strike caused a fire which damaged the second floor and attic of a home. | | Hanover | 0 | 0 | 70,000 | 7, 13 |
| 1/13/2000 | Wind | No detail available. | | Henrico, City of Richmond | 0 | 0 | 3,000 | 13 |

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 1/19/2000 | Winter Storm | Two to four inches of snow fell overnight as an area of low pressure passed south of the region. The highest amounts were measured along a line from Caroline county in the north, through the city of Richmond, then along the southern shore of the James River to near the Newport News area. Snow briefly fell heavily after midnight, creating hazardous driving conditions. | | Goochland, Hanover, Henrico, City of Richmond, New Kent, Powhatan | 0 | 0 | - | 7 |
| 1/25/2000 | Winter Storm | A significant winter storm dumped over one foot of snow across much of central and eastern Virginia, with isolated amounts of up to 19 inches reported. There was also significant blowing and drifting of snow as winds gusted over 30 mph during the storm. The Richmond International Airport was closed during this storm. A very cold air mass built into the region after the storm, preserving the snowpack for over a week in many areas. Snow drifts of 3 to 5 feet were reported, especially in the south central Virginia counties of Dinwiddie, Brunswick, and Mecklenburg. Specific county totals were: Charles City County 15 inches, Goochland County 9.5 inches, Hanover County 9 to 12 inches, Henrico County including Richmond City 10 to 12.5 inches, New Kent County 16 inches, and Powhatan County 9 inches. | Yes | Charles City, Goochland, Hanover, Henrico, New Kent, Powhatan, City of Richmond | 0 | 0 | - | 7,8 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|----------------------------------|------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 1/25/2000 winter storm continued | | Several inches of snow was on the ground at daybreak, with winds gusting at 25 to 45 mph creating blizzard conditions in some areas. The region was at a stand still. Airports and transit systems were shut down. Schools were closed. Federal, state and county government offices were closed or quickly closed once the full impact of the storm was realized. The heaviest band of snow fell from south central Virginia through Petersburg and the Northern Neck with a foot to a foot and a half of snow. Drifts of four to five feet were common. Snow mixed with sleet and freezing rain in some of the eastern counties. For those who did venture out on the 25th, numerous traffic accidents occurred. Cold weather followed with the fresh snow pack and temperatures fell into the single digits in the western valleys and piedmont. One woman died of hypothermia. | | | | | | |
| 1/30/2000 | Ice Storm | An ice storm affected a large portion of central and eastern Virginia with ice accumulations of up to one-half inch. Freezing rain mixed with sleet and snow spread over the area during the morning hours. Freezing rain then mixed with rain during the afternoon and evening along the eastern counties of Charles City and New Kent. Farther west, freezing rain fell for most of the day with general accumulations from one-fourth to one-half inch. At one point, 300,000 people were without power in the Richmond vicinity due to the weight of ice downing trees and power lines. One Richmond TV station was knocked off the air for 45 minutes Two people were reported injured in Richmond; one while cutting downed trees with a chainsaw, another in a sledding accident. | | Goochland, Hanover, Henrico, City of Richmond, New Kent, Powhatan | 0 | 2 | 665,000 | 7, 13 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|--|--------------------------|--|--------|----------|---------------------|-------------|
| 2/12/2000 | Winter Storm | A low pressure system tracked eastward from the Ohio valley and spread mainly light snow, sleet, and freezing rain across portions of central and eastern Virginia. Accumulations ranged from one to two inches, with one report of three inches of snow received from southern Louisa county. Warmer air moved in during the late afternoon and changed the precipitation over to rain. | | Hanover | 0 | 0 | - | 7 |
| 4/17/2000 | Hail | 0.75 to 1 inch diameter hail reported. | | Goochland; Hanover; Henrico; New Kent; Powhatan | 0 | 0 | - | 7 |
| 5/13/2000 | Lightning | A lightning strike ignited a housefire which burned the roof off a two story dwelling. The fire was brought under control in about 20 minutes. | | Henrico | 0 | 0 | 75,000 | 7, 13 |
| 5/19/2000 | Tornado | Fire and Rescue personnel reported a Tornado on the ground at the intersection of Rural Point Road and Studley Road. An NWS storm survey the following day found only isolated trees and numerous branches down in a densely wooded area, but there was no concentrated area of damage or a damage path visible. | | Hanover | 0 | 0 | - | 7 |
| 5/19/2000 | Hail | Hail ranging in size from 0.75 to 1.75 inches reported. | | Goochland; Hanover; New Kent | 0 | 0 | 10,000 | 7, 13 |
| 5/27/2000 | Lightning | Lightning struck a house causing \$50,000 in damage. The blaze was brought under control by 700 PM EDT. Over 10,000 residents were without power due to lightning induced power outages from the same storm. | | Henrico | 0 | 0 | 50,000 | 7, 13 |
| 6/13/2000 | Lightning | At 8 pm in East Highland Park (Henrico County), lightning struck near the Classic Amphitheatre and affected a person with a pacemaker. Subject was taken to hospital by ambulance. | | Henrico | | 1 | | 6, 7, 13 |
| 6/14/2000 | Thunderstorm Winds | High winds blew down a large tree onto Route 623. | | Goochland | 0 | 0 | 2,000 | 7, 13 |
| 6/15/2000 | Thunderstorm Winds | High winds blew down trees over a large part of eastern Hanover County. | | Hanover | 0 | 0 | 10,000 | 7, 13 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|----------------------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 6/27/2000 | Hail | Magnitude: .88-1.5 inch diameter hail | | City of Richmond; Powhatan | 0 | 0 | - | 7 |
| 7/16/2000 | Thunderstorm Winds | High winds blew down several trees. | | Hanover | 0 | 0 | 2,000 | 7, 13 |
| 7/16/2000 | Hail | Magnitude: 0.88-1.75 inch diameter hail | | Henrico | 0 | 0 | - | 7 |
| 7/19/2000 | Severe Storm/Thunder Storm, Wind | No detail available. | | Charles City | 0 | 0 | 1,000 | 13 |
| 7/19/2000 | Flood | Heavy rain overwhelmed storm drains on Maury Street in South Richmond and sent water cascading in the basement of the Richmond Department of Public Utilities' Field Operations and Maintenance Facility. As much as five feet of water filled the 10,000 square foot basement and damaged several computers and internal department records. Ten inches of water was reported across Belt Boulevard between Hull Street and Midlothian Turnpike. | | City of Richmond | 0 | 0 | 5,000 | 7, 13 |
| 8/4/2000 | Flood | Heavy rain caused flooding of secondary roads in Mechanicsville. Heavy rain caused flooding on Carter Road in Lanexa. Heavy rain led to high standing water in the Shockoe Bottom section of downtown Richmond. | | Hanover | 0 | 0 | - | 7 |
| 8/4/2000 | Thunderstorm Winds | High winds blew several trees down on houses. High winds blew trees down in Old Ridge area. | | City of Richmond; Goochland; Hanover | 0 | 0 | 17,000 | 7, 13 |
| 8/9/2000 | Thunderstorm Winds | High winds blew down large tree limbs onto parked cars on Chippenham Parkway and caused minor damage. High winds blew numerous trees down near Georges Tavern. High winds blew off part of the roof of Brown Grove Baptist Church on Ashcake Road. Part of a chimney was toppled and the church also suffered minor water damage. High winds blew down numerous trees near Scotchtown. Amateur radio reported a thunderstorm with 60 mile per hour wind gusts caused damage to road signs on Route 6. High winds blew several large trees onto power lines and caused local power outages. | | City of Richmond; Goochland; Hanover; Henrico; Powhatan | 0 | 0 | 22,000 | 7, 13 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|--------------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| 8/11/2000 | Flood | Very heavy rain caused flooding and the closure of the intersection of West Canal and South Adams Streets in downtown Richmond. High water also closed Bainbridge Street at 20th Street. | | City of Richmond | 0 | 0 | - | 7 |
| 8/11/2000 | Thunderstorm Winds | High winds blew down a wooden walkway which landed on a car in the 400 block of East Broad Street. The vehicle was heavily damaged. | | City of Richmond | 0 | 0 | 15,000 | 7, 13 |
| 9/3/2000 | Flood | Slow-moving thunderstorms dumped heavy rain over portions of the eastern Virginia piedmont causing flooding of the intersection of Routes 522 and 60 near Powhatan. | | Powhatan | 0 | 0 | - | 7 |
| 12/17/2000 | Thunderstorm Winds | A strong thunderstorm wind gust blew a tree down on a car on Interstate 95 at mile marker 88. Two occupants of the vehicle suffered minor injuries. | | Hanover | 0 | 2 | 5,000 | 7, 13 |
| 12/19/2000 | Winter Storm | A light snow accumulation contributed to at least one vehicle accident in Goochland county. Snowfall totals included: Pamplin City 3 inches, Goochland 2 inches, Powhatan 1.5 inches, and Blackstone 1 inch. | | Goochland, Powhatan | 0 | 0 | 2,000 | 7, 13 |
| 2/22/2001 | Winter Storm | A winter storm produced 1 to 5 inches of snow across southcentral and eastern Virginia. The higher amounts of snow (3 to 4 inches) generally occurred along a band which extended from Farmville to Richmond City to Kilmarnock (in Lancaster county). Local law enforcement agencies reported numerous accidents, some of which involved injuries. Many schools were dismissed early on the day of the storm, and several schools in the area were either closed or had a delayed opening the following day due to slippery road conditions. One accident included a 70-vehicle crash on a quarter-mile stretch of I-95 near Ashland, which severely injured a jail guard and caused lesser injuries to several other people. Also, there were several multicar crashes on I-64, including a 20-car pileup in Goochland county that killed one person. | | Goochland, Hanover, Henrico, City of Richmond, New Kent, Powhatan | 0 | 0 | - | 7 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|---|--------------------------|------------------------------------|--------|----------|---------------------|-------------|
| 5/26/2001 | Hail | Magnitude: 0.75 inch diameter hail | | Goochland, Powhatan | 0 | 0 | - | 7 |
| 6/1/2001 | Flood | Five inches of rainfall and high water reported by spotter. High water eastern portion of Henrico and Hanover Counties. Several roads closed. | | New Kent | 0 | 0 | - | 7 |
| 6/6/2001 | Thunderstorm Winds | Trees and power lines down. | | Henrico, City of Richmond | 0 | 0 | 7,000 | 7 |
| 6/6/2001 | Hail | Magnitude: 0.75-1 inch diameter hail | | City of Richmond; Hanover; Henrico | 0 | 0 | - | 7 |
| 6/6/2001 | Flood | I-95 north bound closed at Broad Street underpass where 2 feet of water covered the roadway. | | City of Richmond | 0 | 0 | - | 7 |
| 6/15/2001 | Tornado | Several trees down and some damage to Bank of American Building. | | Henrico | 0 | 0 | 5,000 | 7 |
| 6/22/2001 | Thunderstorm Winds | Trees down near Laburnum Avenue and Creighton Road. | | Henrico | 0 | 0 | 2,000 | 7 |
| 7/22/2001 | Thunderstorm Winds | A dust devil occurred in a store parking lot on West Broad Street. Flying debris caused 4 minor injuries and damage to cars and property. | | Henrico | 0 | 4 | 10,000 | 7 |
| 8/27/2001 | Thunderstorm Winds | Four large trees down on road. | | Goochland | 0 | 0 | 2,000 | 7 |
| 8/27/2001 | Hail | Magnitude: 0.75 inch diameter hail | | Goochland | 0 | 0 | - | 7 |
| 8/30/2001 | Thunderstorm Winds | Trees down on Route 606. | | Goochland | 0 | 0 | 2,000 | 7 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 1/2/2002 | Winter Storm | A winter storm produced 5 to 8 inches of snow across the piedmont of central Virginia, the Virginia northern neck, the middle peninsula, and the Virginia eastern shore. Some specific higher snow totals included: City of Richmond 7-8", City of Colonial Heights 8", Gloucester Point in Gloucester county 8", Mechanicsville in Hanover county 8", Nassawadox in Northampton county 8", Parksley in Accomack county 7", and Ruther Glen in Caroline county 7.5". Local law enforcement agencies reported numerous accidents. Most, if not all schools in the area, were closed Thursday, January 3rd and Friday, January 4th due to very slippery road conditions. | | Charles City, Goochland, Hanover, Henrico, New Kent, Powhatan, City of Richmond | 0 | 0 | - | 7 |
| 1/19/2002 | Winter Storm | A winter storm produced a mixture of snow, sleet, and freezing rain across portions of central Virginia. Snowfall totals were 2 to 4 inches, except up to 5 inches occurred in parts of Fluvanna county. Local law enforcement agencies reported numerous accidents due to very slippery road conditions. | | Goochland, Hanover, Henrico, City of Richmond, Powhatan | 0 | 0 | - | 7 |
| 3/26/2002 | Thunderstorm Winds | Trees down. | | Henrico | 0 | 0 | 2,000 | 7 |
| 5/7/2002 | Thunderstorm Winds | Trees down. | | Henrico | 0 | 0 | 2,000 | 7 |
| 5/9/2002 | Thunderstorm Winds | Trees down, some uprooted. Power lines down. | | Powhatan | 0 | 0 | 2,000 | 7 |
| 5/9/2002 | Hail | Magnitude: 0.75 inch diameter hail | | Hanover | 0 | 0 | - | 7 |
| 5/13/2002 | Thunderstorm Winds | Tree down blocking road on Route 250. | | Goochland | 0 | 0 | 1,000 | 7 |
| 6/6/2002 | Thunderstorm Winds | Large trees down. | | Henrico, New Kent | 0 | 0 | 4,000 | 7 |

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Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|--------------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| 12/4/2002 | Winter Storm | A winter storm produced 1 to 4 inches of snow along with 1/4 to 1/2 inch of ice from southcentral Virginia northeast through the middle peninsula and Virginia northern neck. Some specific higher snow totals included: Chase City in Mecklenburg county 4", Victoria in Lunenburg county 4", Chesterfield in Chesterfield county 4", Short Pump in Henrico county 4", Richmond City 4", Warsaw in Richmond county 3.5", Heathsville in Northumberland county 3.5", Lawrenceville in Brunswick county 3.5", Kilmarnock in Lancaster county 3", Saluda in Middlesex county 3", Dinwiddie in Dinwiddie county 3", and New Kent in New Kent county 3". Numerous trees and power lines were reported down due to ice accumulations. This resulted in scattered power outages. Local law enforcement agencies also reported numerous accidents. Most, if not all schools in the area, were closed Thursday, December 5th and Friday, December 6th due to power outages and very slippery road conditions. | | Goochland, Charles City, Hanover, City of Richmond, New Kent, Powhatan | 0 | 0 | - | 7 |
| 12/11/2002 | Winter Weather/mix | Freezing rain caused minor ice accumulations on trees, power lines, bridges and overpasses across portions of the central Virginia Piedmont. A few power outages and accidents were reported. | | Goochland, Hanover, Powhatan | 0 | 0 | - | 7 |
| 1/6/2003 | Winter Weather/mix | A weak winter storm produced only a dusting to 1 inch of snow across portions of central and eastern Virginia. Some specific snow totals included: City of Hampton 1", Eastern Newport News 1", City of Suffolk 1", City of Norfolk 0.5", Pembroke area of Virginia Beach 0.5", Gloucester in Gloucester county 0.5", and Ruther Glen in Caroline county 0.5". Accumulations from this storm were mostly on cars and grassy areas, with roadways remaining generally wet although some slush was reported. | | Charles City, Goochland, Hanover, Henrico, New Kent, Powhatan, City of Richmond | 0 | 0 | - | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|---|--------------------------|--|--------|----------|---------------------|-------------|
| 1/14/2003 | Winter Weather/mix | A weak winter storm produced one half (0.5) to one and one half (1.5) inches of snow across portions of the Virginia northern neck, middle peninsula, and Hampton Roads area. Some specific snow totals included: Kilmarnock in Lancaster county 1.5", Saluda in Middlesex county 1.5", King and Queen in King and Queen county 1-1.5", City of Newport News 1", City of Williamsburg 1", Ruther Glen in Caroline county 0.75", and Wallops Island in Accomack county 0.5". | | New Kent | 0 | 0 | - | 7 |
| 1/16/2003 | Winter Storm | A winter storm produced 1 to 8 inches of snow across portions of central and eastern Virginia. Some specific higher snow totals included: Toano in James City county 8", Northern portion of York county 8", Gloucester in Gloucester county 7", Deltaville in Middlesex county 6.5", Mathews in Mathews county 6.5", Chincoteague in Accomack county 6", City of Newport News 6", Eastville in Northampton county 5.5", City of Hampton 5", City of Williamsburg 5", Surry in Surry county 5", West Point in King and Queen county 5", and Mangohick in King William county 5". Mechanicsville in Hanover county 3", Western Branch in Chesapeake 3", City of Suffolk 3", Palmyra in Fluvanna county 2.5", Powhatan in Powhatan county 2.5", Cumberland in Cumberland county 2", Victoria in Lunenburg county 2", City of Norfolk 2", and Farmville in Prince Edward county 2". Local law enforcement agencies reported numerous accidents. Most, if not all schools in the area, were closed Friday, January 17th due to very slippery road conditions. | | Charles City, Goochland, Hanover, New Kent, City of Richmond | 0 | 0 | - | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| 1/30/2003 | Winter Storm | A winter storm produced 3 to 5 inches of snow across portions of central Virginia. Some specific higher snow totals included: Crewe in Nottoway county 5", Farmville in Prince Edward county 4", Trenholm in Powhatan county 4", Gum Spring in Louisa county 4", Montpelier in Hanover county 4", Fife in Goochland county 4", Ashby in Cumberland county 4", and Ruther Glen in Caroline county 4". Local law enforcement agencies reported numerous accidents. Most, if not all schools in the area, were dismissed early on Thursday, January 30th due to very slippery road conditions. | | Goochland, Hanover, Powhatan | 0 | 0 | - | 7 |
| 1/30/2003 | Winter Weather/mix | A winter storm produced around one inch of snow across portions of central Virginia. Local law enforcement agencies reported several accidents. | | Charles City, New Kent, City of Richmond | 0 | 0 | - | 7 |
| 2/6/2003 | Winter Storm | A winter storm produced 4 to 7 inches of snow across the piedmont of central Virginia and the Virginia northern neck. The higher snow amounts occurred in Caroline, Cumberland, Essex, Fluvanna, Goochland, Hanover, and Louisa counties. Local law enforcement agencies reported numerous accidents. Most, if not all schools in the area, were closed Friday, February 7th due to very slippery road conditions. | | Goochland, Hanover, Henrico, City of Richmond, Powhatan | 0 | 0 | - | 7 |
| 2/10/2003 | Winter Weather/mix | A weak winter storm produced 0.5 to 1 inch of snow across portions of the piedmont of central Virginia and the Virginia northern neck. Although, Louisa county reported 2 to 3 inches of snow. Accumulations from this storm were mostly on cars and grassy areas, with roadways remaining generally wet although some slush was reported. | | Goochland, Hanover, Henrico, City of Richmond, Powhatan | 0 | 0 | - | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------|---|--------------------------|---|--------|----------|---------------------|-------------|
| 2/15/2003 | Winter Storm | A winter storm produced 1 to 9 inches of snow, along with sleet and freezing rain, across central and eastern Virginia. Some specific higher snow totals included: Charles City in Charles City county, Ruther Glen in Caroline county 9", Dunnsville in Essex county 8", Louisa in Louisa county 8", Newland in Richmond county 8", Heathsville in Northumberland county 7.5", Amelia in Amelia county 6.5", King William in King William county 6.5", Palmyra in Fluvanna county 6", Montross in Westmoreland county 6", Lancaster in Lancaster county 5.5", Northern Accomack county 5", Midlothian in Chesterfield county 5", Goochland in Goochland county 5", and Doswell in Hanover county 5". Local law enforcement agencies reported numerous accidents. Most, if not all schools in the area, were closed Monday, February 17th due to very slippery road conditions. | | Goochland, Hanover, Henrico, City of Richmond, Powhatan, New Kent, Charles City | 0 | 0 | - | 7 |
| 2/26/2003 | Winter Storm | A winter storm produced 1 to 4 inches of snow, along with sleet and 1/8 to 1/2 inch of ice accumulation, across central and eastern Virginia. Some specific higher snow totals included: Ruther Glen in Caroline county 4.5", Bowling Green in Caroline county 3", West Point in King William county 3", Reedville in Northumberland county 3", Beaverdam in Hanover county 2.5", Louisa in Louisa county 2-3", and Montross in Westmoreland county 2-3". Local law enforcement agencies reported numerous accidents. Most, if not all schools in the area, were closed Thursday, February 27th due to very slippery road conditions. | | Goochland, Hanover, Henrico, City of Richmond, Powhatan | 0 | 0 | - | 7 |

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| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|------------|-------------------|--|--------------------------|---|--------|----------|---------------------|-------------|
| 9/18/2003 | Hurricane (flood) | Hurricane Isabel - Strong winds up to hurricane force - more than 74 miles per hour - were expected as far inland as the metropolitan Richmond area. Statewide, \$257 million in state and federal assistance was approved for individuals and businesses that suffered damage from Hurricane Isabel. Hurricane Isabel storm damage in the commonwealth has reached an estimated \$1.6 billion, with the final tally expected to be higher. | Yes | Charles City, Goochland, Hanover, Henrico, New Kent, Powhatan, City of Richmond | | | 1,600,000,000 | 9, 10 |
| 9/23/2003 | Tornado | F1 tornado downed numerous trees and destroyed one shed. Also, several metal roofs on commercial buildings were damaged. | | Henrico | 0 | 0 | 25,000 | 7 |
| 9/23/2003 | Tornado | F1 tornado along Studley Road. Numerous trees down. | | Hanover | 0 | 0 | 5,000 | 7 |
| 9/23/2003 | Tornado | F1 tornado damaged several homes between Azalea and Wilmer Avenues. Trees uprooted and shed overturned. | | City of Richmond | 0 | 0 | 25,000 | 7 |
| 12/14/2003 | Winter Storm | One to four inches of snow, and 1/4 to 1/2 inch of ice due to freezing rain, occurred across portions of central Virginia. The freezing rain on power lines resulted in scattered power outages, and roadways were very slippery. | | Goochland, Hanover, Powhatan | 0 | 0 | - | 7 |
| 1/9/2004 | Winter Storm | Two to as much as five inches of snow fell across portions of central, southcentral, and southeast Virginia. Some higher amounts included: Victoria in Lunenburg county 5", Farmville in Prince Edward county 4", Great Bridge in Chesapeake city 3-4", Blackstone in Nottoway county 3-4", City of Portsmouth 3.5-4", Fluvanna county 3-4", South Hill in Mecklenburg county 2-3", City of Emporia 2.5-3", and Louisa in Louisa county 2.5". The snow produced very slippery roadways, which resulted in several accidents. | | Goochland, Powhatan | 0 | 0 | - | 7 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|---|--------------------------|--|--------|----------|---------------------|-------------|
| 1/25/2004 | Winter Storm | Four to as much as six inches of snow and sleet fell across portions of central Virginia. Some higher amounts included: Farmville in Prince Edward county 6", Cumberland in Cumberland county 6", Montpelier in Hanover county 6", Columbia in Fluvanna county 5", Goochland in Goochland county 5", Glen Allen in Henrico county 5", New Kent Courthouse in New Kent county 5" and Tappahannock in Essex county 5". The snow and sleet produced very slippery roadways, which resulted in numerous accidents and school closings for a few days. | | Goochland, Hanover, Henrico, City of Richmond, Powhatan | 0 | 0 | - | 7 |
| 2/17/2004 | Winter Weather/mix | One half inch to two inches of snow fell across portions of central Virginia and the Virginia northern neck. The snow produced slippery roadways, which resulted in a few accidents. | | Charles City, Hanover, Henrico, New Kent, City of Richmond | 0 | 0 | - | 7 |
| 3/7/2004 | Thunderstorm Winds | Trees downed (7-8) or snapped. | | Powhatan | 0 | 0 | 2,000 | 7 |
| 5/5/2004 | Hail | Baseball size hail reported. Vehicles damaged. | | Hanover | 0 | 0 | 5,000 | 7 |
| 5/5/2004 | Hail | Golfball size hail near I-295 and Creighton Road. | | Henrico | 0 | 0 | - | 7 |
| 5/16/2004 | Hail | No detail available. | | Hanover | 0 | 0 | - | 7 |
| 5/26/2004 | Thunderstorm Winds | Trees down. | | Goochland | 0 | 0 | 2,000 | 7 |
| 5/26/2004 | Thunderstorm Winds | Trees down on Route 522. | | Powhatan | 0 | 0 | 2,000 | 7 |
| 6/10/2004 | Flash Flood | High water on Bikerstaff Road and 7400 block of Strath Road. Road washed out at Ocano Drive. | | Henrico | 0 | 0 | - | 7 |
| 6/10/2004 | Flash Flood | In the Shockoe Bottom area, several restaurants were flooded along with street flooding. | | City of Richmond | 0 | 0 | - | 7 |
| 6/16/2004 | Flash Flood | Rainfall amounts between 4 and 5 inches continued to result in numerous road closures in the western half of county. | | Powhatan | 0 | 0 | - | 7 |
| 6/17/2004 | Thunderstorm Winds | Numerous trees down | | Goochland | 0 | 0 | 2,000 | 7 |
| 6/18/2004 | Thunderstorm Winds | Trees down on Patterson Avenue. | | City of Richmond | 0 | 0 | 2,000 | 7 |
| 6/30/2004 | Thunderstorm Winds | Trees down. | | New Kent | 0 | 0 | 2,000 | 7 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|--|--------------------------|------------------------|--------|----------|---------------------|-------------|
| 7/7/2004 | Hail | No detail available. | | Henrico | 0 | 0 | - | 7 |
| 7/7/2004 | Thunderstorm Winds | Trees down. | | Henrico | 0 | 0 | 2,000 | 7 |
| 7/7/2004 | Thunderstorm Winds | Trees down. Large 80 foot oak tree down on power lines. | | Hanover | 0 | 0 | 4,000 | 7 |
| 7/7/2004 | Thunderstorm Winds | Numerous trees and power lines down in the central and eastern part of the county. | | Powhatan | 0 | 0 | 2,000 | 7 |
| 7/27/2004 | Flash Flood | Street flooding near the Boulevard and I-95. | | City of Richmond | 0 | 0 | - | 7 |
| 8/30/2004 | Tornado | F0 tornado touched down at Cumberland Hospital downing trees and causing some structural damage. Tornado then caused intermittent damage to trees along a nearly 6 mile path ending about 2 miles south of Tunstall. | | New Kent | 0 | 0 | 10,000 | 7 |
| 8/30/2004 | Tornado | F0 tornado downed or damaged trees along Routes 606, 607, and 619. | | New Kent | 0 | 0 | 5,000 | 7 |
| 8/30/2004 | Tornado | F0 tornado downed or damaged trees along Route 693. | | Hanover | 0 | 0 | 5,000 | 7 |
| 8/30/2004 | Tornado | F0 tornado downed trees, and caused minor damage to buildings and cars at the University of Richmond. | | City of Richmond | 0 | 0 | 10,000 | 7 |
| 8/30/2004 | Flash Flood | Rainfall amounts between 4 and 8 inches resulted in numerous road closures due to flooding. | | Charles City; New Kent | 0 | 0 | - | 7 |

Appendix D: Hazard History

Richmond Regional Hazard Mitigation Plan

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|---|--------------------------|------------------------------------|--------|----------|---------------------|-------------|
| 8/30/2004 | Flood | Tropical Depression Gaston - System brought as much as 14" of rain to some areas. Homes, apartments, and businesses in low-lying areas were flooded and many streets were impassable. In Richmond City, Chesterfield County and Henrico County, an estimated 350 housing units were either destroyed or received major damage, including single-family homes, apartment units and mobile homes. More than 230 businesses were affected by floodwaters, in addition to the economic injuries suffered by the owners and employees. Statewide road damages of \$20 million. \$8.7 million in disaster assistance grants and loans. 7 deaths in Richmond, Hanover, and Henrico. Rainfall amounts between 5 and 12 inches resulted in numerous road closures due to flooding. In addition, about 20 blocks of downtown Richmond were condemned due to the floodwaters. A brick building collapsed in the city's historic and low-lying Shockoe Bottom area, and several dozen buildings had extensive water damage after floodwaters reached depths of up to 10 feet. | Yes | City of Richmond; Hanover; Henrico | 7 | 0 | 20,000,000 | 7, 9, 10 |
| 9/8/2004 | Tornado | F0 tornado produced minor damage to businesses near Orleans Street. This tornado entered from Henrico county. | | City of Richmond | 0 | 0 | 2,000 | 7 |
| 9/8/2004 | Tornado | F0 tornado produced structural damage to outbuildings and storage facilities at several businesses along Old Osborne Turnpike. This tornado tracked into the City of Richmond. | | Henrico | 0 | 0 | 5,000 | 7 |
| 9/8/2004 | Thunderstorm Winds | Trees down. | | Hanover | 0 | 0 | 2,000 | 7 |

| Date | Event Type | Event Description | Presidential Declaration | Affected Communities | Deaths | Injuries | Estimated Damage \$ | Data Source |
|-----------|--------------------|--|--------------------------|----------------------|--------|----------|---------------------|-------------|
| 9/17/2004 | Tornado | F0 tornado damaged some homes in the Hampshire Subdivision, off Nuckols Road. Shingles were torn off of some roofs and garage doors blown in. Also, damage to homes in the Autumnwood Subdivision off of Shady Grove Road. | | Henrico | 0 | 0 | 15,000 | 7 |
| 9/17/2004 | Tornado | F1 tornado damaged a home on Broad Street in the Three Oaks Subdivision. Numerous trees were snapped and blown down. Roof partial blown off house. | | Goochland | 0 | 0 | 10,000 | 7 |
| 9/17/2004 | Tornado | F1 tornado downed numerous trees. | | Goochland | 0 | 0 | 3,000 | 7 |
| 9/17/2004 | Tornado | F0 tornado downed trees. | | Hanover | 0 | 0 | 5,000 | 7 |
| 9/17/2004 | Flash Flood | High water at Manakin and Hermitage Streets, and on Broad Street Road in town of Goochland. | | Goochland | 0 | 0 | - | 7 |
| 9/17/2004 | Flash Flood | Flooding reported on New Kent Road, Jennie Scher and Stoney Run Roads, Fairmount Road, and Mechanicsville Turnpike. | | City of Richmond | 0 | 0 | - | 7 |
| 9/17/2004 | Thunderstorm Winds | Trees down near Old Ridge Road and Blunt Bridge. | | Hanover | 0 | 0 | 4,000 | 7 |
| 9/17/2004 | Flash Flood | High water reported on Greenwood Church Road, Rosmarin Road, Mountain Road, Auburn Mill Road, and Stone Horse Road. | | Hanover | 0 | 0 | - | 7 |
| 9/17/2004 | Thunderstorm Winds | Trees down at Junction of Routes 711 and 288. | | Powhatan | 0 | 0 | 2,000 | 7 |
| 9/17/2004 | Flash Flood | Portions of Highway 60 flooded. Route 711 closed due to high water. | | Powhatan | 0 | 0 | - | 7 |
| | | | | | | | | |

Data Sources

- 1 - Community Flood Insurance Study
- 2 - <http://www.geol.vt.edu/outreach/vtso/VA-Eq.html>
- 3 - <http://www.mme.state.va.us/DMR/PUB/Brochures/quake.html>
- 4 - http://www.richmondva.org/HTML/About_Richmond/History.lasso
- 5 - <http://www.shgresources.com/va/timeline/>
- 6 - <http://www.vdem.state.va.us/library/lightning/va-lightning.htm>
- 7 - NCDC Database
- 8 - <http://www.vdem.state.va.us/library/vawinter/va-win.htm>
- 9 - www.fema.gov
- 10 - VDEM
- 11 - www.vdem.state.va.us/library/vahurr/va-hurr.htm
- 12 - www.vdem.state.va.us/library/vatorm/va-tors.htm
- 13 - SHELDS

APPENDIX E – FLOOD PRONE ROADWAYS

***Charles City County*¹**

Flood Prone Roadways identified by VDOT and Local Sources

- Route 603 0.5 mile west of Route 609
- Route 609 south of Route 625
- Route 602 1 mile north of Route 155
- Route 626 1 mile south of Route 615
- Route 614 @ Morris Creek
- Route 613 1.5 miles south of Route 5
- Route 631 @ Bradley Run
- Route 618 0.25 mile south New Kent County /Charles City County Line

***Goochland County*²**

Flood Prone Roadways identified by VDOT and Local Sources

- Route 600 @ Rock Castle
- Route 618 @ Bridge 0.4 miles west of 616
- Route 608 @ Elk Hill
- Route 608 1 mile north of Route 606
- Route 608 @ Little Lickinghole Creek
- Route 687 0.5 mile south of Route 608
- Route 687 0.75 mile north of Route 6
- Route 680 @ dead end
- Route 616 @ Little Lickinghole Creek
- Route 600 @ Little Lickinghole Creek
- Route 613 @ Big Lickinghole Creek
- Route 673 @ Big Lickinghole Creek
- Route 611 @ Big Lickinghole Creek
- Route 609 @ Big Lickinghole Creek
- Route 607 @ Irwin
- Route 603 @ Elk Island Bridge
- Route 603 @ Byrd Creek

¹ *Rural Flood Prone Roadway Study* (June 27, 2003). Richmond Regional Planning District Commission.

² *Rural Flood Prone Roadway Study*.

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- Route 667 @ Byrd Creek
- Route 667 @ Little Byrd Creek
- Route 610 @ Little Byrd Creek
- Route 609 @ Little Byrd Creek
- Route 603 @ Little Wittle Creek
- Route 609 @ Mill Creek
- Route 681 1 mile south of Route 605
- Route 646 1 mile south of Route 250
- Route 669 0.75 mile south of Route 250
- Route 632 @ Beaver Dam Creek
- Route 639 @ Beaver Dam Creek
- Route 645 0.75 north of Route 6
- Route 628 @ dead end

***Hanover County*³**

- 301/Kersey Creek Hanover Wayside
- Bell Creek Road (Near Ukrops/Home Depot)
- Mechumps Creek/Goddins Hill Road
- Cool Springs Road/New Ashcake Road 637/643
- Rt 640 between Studley and 301
- Studley Road between 640/643
- Rt. 656 @ 798 & Rt. 654
- McClellan Road/Spill Way Lane
- Shady Grove Rd between 606/301
- Sliding Hill Road @ 798/654
- 360 East and West at Henrico Line
- Peaks Road
- Atlee Station/Cool Spring Road
- Georgetown Road/Rt. 301
- Flannigan Mill Road/Sandy Valley Road
- Ellerson Drive/Christian Lane
- Studley Road 1 mile south of Rural Point Road
- McClelland Road/Lakeview Road
- Mary Esther Lane/Walnut Grove Road
- Buckeye Road/Studley Road
- Flannigans Mill Road/Bon Mar Road
- Creighton Road/Henrico Line

³ Road Closures during Tropical Storm Gaston. Information provided by Hanover County.

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- Meadowbridge Road/Henrico Line
- Rt. 301 and Depot Road
- Rt. 301 and Hillcrest
- Little Florida Road ½ mile from 360
- Sandy Valley Road/Creighton Road
- River Road/Crumps Road
- Academy Drive/Shady Grove Road
- Academy Drive/Triple Lane
- Academy Drive/Dead end
- Richfood Road/301
- 9551 Fawn Park Lane
- Parsleys Mill Road/McClellan Road
- Summer Hill/Summer Plains Road
- Georgetown Road/Dam
- Market Road at bridge
- Lakeshore Court/Chickahominy River Lane
- Open Meadows Lane
- Studley Farms Lane/ Studley Farms Drive
- Colonial Forest/Georgetown Road

New Kent County⁴

Flood Prone Roadways identified by VDOT and Local Sources

- Route 638 @ Cattail Swamp Pond Creek
- Route 606 @ County Line Bridge
- Route 607 @ dead end
- Route 614 @ White House
- Route 606 @ Tunstall
- Route 624 @ dead end
- Route 625 @ dead end
- Route 33 0.25 mile west of West Point
- Route 636 @ Plum Point
- Route 1002 Intersection with Route 627
- Route 627 @ Chickahominy Shores
- Route 618 south of Interstate 64
- Route 615 Between Routes 106 and 60

⁴ *Rural Flood Prone Roadway Study.*

Powhatan County⁵

Flood Prone Roadways identified by VDOT and Local Sources

- Route 603 @ Rocky Ford Creek
- Route 603 @ Skippers Creek
- Route 604 @ Butterwood Creek
- Route 603 @ Butterwood Creek
- Route 614 @ Jones Creek
- Route 711 Between Routes 659 and 617
- Route 711 West of Route 652
- Route 652 @ dead end
- Route 669 @ boat landing

⁵ *Rural Flood Prone Roadway Study.*

APPENDIX F – SUMMARY OF FLOODPLAIN EXPOSURE

Charles City County

- Total parcels: 5,838
- Total parcels completely within floodplain: 64
- Total parcels partially within floodplain: 676
- Value is dwelling value and improvement value

Parcels completely within floodplain

- Count includes only parcels with dwellings/improvements. All are pre-FIRM.
- Exposure is equal to total value.

| | |
|---------------|-----------|
| Total count | 14 |
| Total value | \$983,800 |
| Average value | \$70,271 |

| Improvement Type | Total | Count |
|--------------------|------------------|-----------|
| <i>Dwelling</i> | \$911,700 | 7 |
| <i>Improve</i> | \$52,100 | 6 |
| <i>Vacant</i> | \$20,000 | 1 |
| Grand total | \$983,800 | 14 |

Parcels partially within floodplain

- Count includes only parcels with dwellings/improvements built pre-FIRM (17% of whole).
- An average value was determined for each improvement type found on parcels partially within the floodplain. Exposure was based on an estimate of the number of parcels with structures in the floodplain (20%) multiplied by the previously determined average value.

| | |
|----------------------|--------------|
| Total count | 240 |
| Total building value | \$31,375,800 |
| Average value | \$130,733 |
| Potential exposure | \$6,275,160 |

| Improvement Type | Total | Count | Exposure |
|---------------------|---------------------|------------|--------------------|
| <i>Barn</i> | \$13,800 | 1 | \$2,760 |
| <i>Commercial</i> | \$8,200 | 2 | \$1,640 |
| <i>Dwelling</i> | \$28,747,300 | 186 | \$5,749,460 |
| <i>Fire station</i> | \$4,500 | 1 | \$900 |
| <i>Improvement</i> | \$544,100 | 26 | \$108,820 |
| <i>Office</i> | \$39,700 | 1 | \$7,940 |
| <i>Plantation</i> | \$817,000 | 2 | \$163,400 |
| <i>Unknown</i> | \$46,600 | 2 | \$9,320 |
| <i>Vacant</i> | \$1,154,600 | 19 | \$230,920 |
| Grand total | \$31,375,800 | 240 | \$6,275,160 |

Richmond Regional Planning District Commission
DRAFT Hazard Mitigation Plan

Goochland County

- Square miles in floodplain: 28.71
- Percentage of total area: 12.1%

- Total parcels: 14,487
- Total parcels completely within floodplain: 0
- Total parcels partially within floodplain: 1,682

Parcels completely within floodplain

- None.

Parcels partially within floodplain

- Count includes only parcels with dwellings/improvements.
- An average value was determined for each zoning type found for parcels partially within the floodplain. Exposure was based on an estimate of the number of parcels with structures in the floodplain multiplied by the previously determined average value. Fifteen percent of agricultural and agricultural/residential were assumed to have structures within floodplain while twenty percent was used for the remaining uses. Exposure was based on an estimate of the number of parcels with structures in the floodplain (20%) multiplied by the previously determined average value.

| | |
|-------------------------|---------------|
| Count | 743 |
| Total improvement value | \$391,814,000 |
| Average value | \$527,342 |
| Potential exposure | \$67,859,340 |

| Zoning | Total improvement value | Count | Exposure |
|---|--------------------------------|--------------|---------------------|
| <i>Agricultural</i> | \$159,033,700 | 554 | \$23,855,055 |
| <i>Commercial</i> | \$9,117,100 | 21 | \$1,823,420 |
| <i>Industrial</i> | \$134,663,500 | 6 | \$26,932,700 |
| <i>Residential</i> | \$37,763,200 | 130 | \$7,552,640 |
| <i>Split – Agricultural/Community</i> | \$109,600 | 2 | \$21,920 |
| <i>Split – Agricultural/Industrial</i> | \$89,400 | 1 | \$17,880 |
| <i>Split – Agricultural/Residential</i> | \$51,035,500 | 28 | \$7,655,325 |
| <i>Split – Community/Residential</i> | - | | - |
| <i>Government</i> | - | | - |
| <i>Unknown</i> | \$2,000 | 1 | \$400 |
| Grand Total | \$391,814,000 | 743 | \$67,859,340 |

Richmond Regional Planning District Commission
DRAFT Hazard Mitigation Plan

Hanover County

- Square miles in floodplain: 49.36
- Percentage of total area: 15.0%

- Total parcels: 44,378
- Total parcels completely within floodplain: 124
- Total parcels partially within floodplain: 4,451

Parcels completely within floodplain

- Count includes only parcels with dwellings/improvements.
- Exposure is equal to total value.

| | |
|-------------------------|-------------|
| Count | 51 |
| Total improvement value | \$9,809,300 |
| Average value | \$ 192,339 |

| Use | Total improvement value | Count |
|---------------------|-------------------------|-----------|
| <i>Agricultural</i> | \$1,739,800 | 20 |
| <i>Commercial</i> | \$3,755,900 | 8 |
| <i>Industrial</i> | \$3,271,200 | 14 |
| <i>Residential</i> | \$1,042,400 | 9 |
| Grand Total | \$9,809,300 | 51 |

Parcels partially within floodplain

- Count includes only parcels with dwellings/improvements.
- An average value was determined for each use found for parcels partially within the floodplain. Exposure was based on an estimate of the number of parcels with structures in the floodplain multiplied by the previously determined average value. Fifteen percent of agricultural and agricultural/residential were assumed to have structures within floodplain while twenty percent was used for the remaining uses.

| | |
|-------------------------|---------------|
| Count | 2,850 |
| Total improvement value | \$875,573,200 |
| Average value | \$307,219 |
| Potential exposure | \$148,903,675 |

| Use | Total improvement value | Count | Exposure |
|---------------------------------|-------------------------|--------------|----------------------|
| <i>Agricultural</i> | \$505,403,300 | 2,030 | \$75,810,495 |
| <i>Agricultural Residential</i> | \$18,816,000 | 84 | \$2,822,400 |
| <i>Commercial</i> | \$98,105,000 | 42 | \$19,621,000 |
| <i>Industrial</i> | \$136,374,500 | 79 | \$27,274,900 |
| <i>Residential</i> | \$116,810,700 | 614 | \$23,362,140 |
| <i>Historic</i> | \$63,700 | 1 | \$12,740 |
| Grand Total | \$875,573,200 | 2,850 | \$148,903,675 |

Richmond Regional Planning District Commission
DRAFT Hazard Mitigation Plan

Henrico County

- Square miles in floodplain: 44.75
- Percentage of total area: 18.4%

- Total parcels: 106,696
- Total parcels completely within floodplain: 4,848
- Total parcels partially within floodplain: 4,350

Parcels completely within floodplain

- Count includes only parcels with dwellings/improvements.
- Exposure is equal to total value.

| | |
|-------------------------|---------------|
| Count | 4,167 |
| Total improvement value | \$677,062,900 |
| Average value | \$162,482 |

| Use | Total | Count |
|-----------------------|----------------------|--------------|
| <i>Club</i> | \$452,900 | 3 |
| <i>Commercial</i> | \$67,494,000 | 54 |
| <i>Government</i> | \$969,200 | 3 |
| <i>Industrial</i> | \$749,000 | 2 |
| <i>Medical</i> | \$16,129,200 | 6 |
| <i>Non-profit</i> | \$2,543,500 | 6 |
| <i>Other</i> | \$655,800 | 39 |
| <i>Residential</i> | \$582,566,900 | 4,091 |
| <i>Transportation</i> | - | 3 |
| <i>Utilities</i> | \$5,009,000 | 6 |
| <i>Vacant</i> | \$493,400 | 630 |
| Grand Total | \$677,062,900 | 4,843 |

Parcels partially within floodplain

- Count includes only parcels with dwellings/improvements.
- An average value was determined for each use found for parcels partially within the floodplain. Exposure was based on an estimate of the number of parcels with structures in the floodplain (30%) multiplied by the previously determined average value.

| | |
|-------------------------|-----------------|
| Count | 3,515 |
| Total improvement value | \$1,766,617,000 |
| Average value | \$502,594 |
| Potential exposure | \$529,985,100 |

Richmond Regional Planning District Commission
DRAFT Hazard Mitigation Plan

Henrico County (cont.)

| Use | Total | Count | Exposure |
|-----------------------|------------------------|--------------|----------------------|
| <i>Club</i> | \$19,233,500 | 8 | \$5,770,050 |
| <i>Commercial</i> | \$651,971,400 | 156 | \$195,591,420 |
| <i>Educational</i> | \$109,663,500 | 18 | \$32,899,050 |
| <i>Government</i> | \$11,616,200 | 6 | \$3,484,860 |
| <i>Industrial</i> | \$104,958,700 | 23 | \$31,487,610 |
| <i>Medical</i> | \$168,489,200 | 9 | \$50,546,760 |
| <i>Non-profit</i> | \$36,608,400 | 19 | \$10,982,520 |
| <i>Other</i> | \$29,870,100 | 25 | \$8,961,030 |
| <i>Residential</i> | \$573,464,600 | 3,181 | \$172,039,380 |
| <i>Transportation</i> | - | | |
| <i>Utilities</i> | \$57,673,500 | 30 | \$17,302,050 |
| <i>Vacant</i> | \$3,067,900 | 40 | \$920,370 |
| Grand Total | \$1,766,617,000 | 3,515 | \$529,985,100 |

Richmond Regional Planning District Commission
DRAFT Hazard Mitigation Plan

New Kent County

- Square miles in floodplain: 33.41
- Percentage of total area: 15.0%

- Total parcels: 15,726
- Total parcels completely within floodplain: 1,005
- Total parcels partially within floodplain: 1,485

Parcels completely within floodplain

- Count includes only parcels with dwellings/improvements.
- Exposure is equal to total value.

| | |
|------------------------|-------------|
| Count | 74 |
| Total assessed value | \$7,342,000 |
| Average assessed value | \$9,216 |

| Use | Total assessed value | Count |
|-----------------------------|----------------------|-----------|
| <i>Hunting/Fishing Club</i> | \$1,367,700 | 6 |
| <i>Agriculture</i> | \$61,000 | 1 |
| <i>Commercial</i> | \$84,100 | 8 |
| <i>Non-profit</i> | \$1,499,700 | 1 |
| <i>Individual</i> | \$4,329,500 | 58 |
| Grand Total | \$7,342,000 | 74 |

Parcels partially within floodplain

- Count includes only parcels with dwellings/improvements.
- An average value was determined for each use found for parcels partially within the floodplain. Exposure was based on an estimate of the number of parcels with structures in the floodplain multiplied by the previously determined average value. Fifteen percent of agricultural and hunting/fishing club were assumed to have structures within floodplain while twenty percent was used for the remaining uses (except for conservation). Conservation uses were assumed to have no structures within floodplain.

| | |
|----------------------|---------------|
| Count | 809 |
| Total assessed value | \$191,418,900 |
| Average value | \$236,612 |
| Potential exposure | \$37,612,380 |

Richmond Regional Planning District Commission
DRAFT Hazard Mitigation Plan

New Kent County (cont.)

| Use | Total | Count | Exposure |
|-----------------------------|----------------------|------------|---------------------|
| <i>Agriculture</i> | \$1,271,600 | 5 | \$190,740 |
| <i>Commercial</i> | \$20,706,800 | 58 | \$4,141,360 |
| <i>Government</i> | \$20,748,400 | 6 | \$4,149,680 |
| <i>Hunting/Fishing Club</i> | \$1,157,600 | 8 | \$173,640 |
| <i>Individuals</i> | \$144,784,800 | 730 | \$28,956,960 |
| <i>Non-profit</i> | \$2,749,700 | 3 | - |
| Grand Total | \$191,418,900 | 809 | \$37,612,380 |

Richmond Regional Planning District Commission
DRAFT Hazard Mitigation Plan

Powhatan

- Square miles in floodplain: 22.06
- Percentage of total area: 8.3%
- No residential, commercial or industrial structures in floodplain.

Richmond Regional Planning District Commission
DRAFT Hazard Mitigation Plan

City of Richmond

- Square miles in floodplain: 6.45
- Percentage of total area: 10.3%

- Total parcels: 68,945
- Total parcels completely within floodplain: 280
- Total parcels partially within floodplain: 1,114

Parcels completely within floodplain

- Count includes only parcels with dwellings/improvements.
- Exposure is equal to total value.

| | |
|------------------------|--------------|
| Count | 147 |
| Total dwelling value | \$40,799,500 |
| Average dwelling value | \$277,548 |

| Use | Total dwelling value | Count |
|--------------------|----------------------|------------|
| <i>Commercial</i> | \$3,341,200 | 10 |
| <i>Government</i> | \$184,000 | 13 |
| <i>Industrial</i> | \$2,682,000 | 27 |
| <i>Mixed Use</i> | \$28,932,500 | 25 |
| <i>Residential</i> | \$5,508,200 | 72 |
| <i>Vacant</i> | \$151,600 | 133 |
| Total | \$40,799,500 | 280 |

Parcels partially within floodplain

- Count includes only parcels with dwellings/improvements.
- An average value was determined for each use found for parcels partially within the floodplain. Exposure was based on an estimate of the number of parcels with structures in the floodplain (40%) multiplied by the previously determined average value.

| | |
|------------------------|---------------|
| Count | 796 |
| Total dwelling value | \$661,089 |
| Average dwelling value | \$2,459,003 |
| Potential exposure | \$210,490,680 |

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City of Richmond (cont.)

| Use | Total dwelling value | Total | Exposure |
|--------------------|----------------------|------------|----------------------|
| <i>Commercial</i> | \$127,669,900 | 18 | \$51,067,960 |
| <i>Government</i> | \$6,342,200 | 10 | \$2,536,880 |
| <i>Industrial</i> | \$117,550,100 | 66 | \$47,020,040 |
| <i>Mixed Use</i> | \$83,461,700 | 65 | \$33,384,680 |
| <i>Other</i> | \$5,178,300 | 3 | \$2,071,320 |
| <i>Residential</i> | \$184,952,600 | 627 | \$73,981,040 |
| <i>Vacant</i> | \$1,071,900 | 7 | \$428,760 |
| Grand Total | \$526,226,700 | 796 | \$210,490,680 |

Data Sources for GIS Analysis:

- Charles City County: Commissioner of the Revenue
- Goochland County: Zoning, property values and acreage - Commissioner of the Revenue; Building points - developed by Woolpert, maintained by Goochland County
- Henrico County: Zoning - Henrico County Planning Department. Parcels - Henrico Department of Finance. Structures - developed by Merrick Inc, provided by the county
- Hanover County and the Town of Ashland: Hanover County Planning Department, Land Records and Mapping GIS
- New Kent County: Addresses determined based on 2002 VGIN Orthography, building permits and the tax assessor's database
- Powhatan County: Land use/zoning was digitized by the Richmond Regional Planning District Commission based on a hand drawn map provided by the county
- City of Richmond: GIS data provided by the city. Parcel data created by Michael Baker Jr. Corporation Inc. based on orthophotography and scanned/registered "keycard" images. Land use data created by city GIS staff based on Vector GIS Parcel Layer, Tax Assessor Office *ProVal Database*, and "General Land Use" look-up-table. Structure data based on created by Michael Baker Jr. Corporation Inc. based on Orthophotography and updated with submitted site plans. Zoning created by city GIS staff based on scanned/registered keycard images, orthophotography and hardcopy zoning maps.
- Flood Insurance Rate Maps – Federal Emergency Management Agency, National Flood Insurance Program; digitized by the Richmond Regional Planning District Commission

APPENDIX G – PLAN REVIEW EXCERPTS

The following plans and regulations were reviewed as part of developing the capability assessment section of this plan (Section VI):

- Charles City County Comprehensive Land Use Plan
- Charles City County Zoning Ordinance (Draft)
- City of Richmond Master Plan 2000-2020
- City of Richmond's Downtown Plan
- City of Richmond Floodplain Ordinance
- Goochland County Capital Improvements Program 2005-2009
- Goochland 2023: The Comprehensive Plan for Goochland County, Virginia
- Goochland County Zoning Ordinance
- Hanover County Comprehensive Plan - Vision 2022
- Hanover County Floodplain Ordinance
- Henrico County 2010 Land Use Plan
- Henrico County Consolidated Plan (for CDBG and HOME)
- Henrico County County Code
- New Kent County Floodplain Ordinance
- New Kent Comprehensive Plan – New Kent Vision 2020
- Powhatan County Comprehensive Plan
- Powhatan County Subdivision Regulations
- Powhatan County Zoning Ordinance
- Town of Ashland Comprehensive Plan

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| Jurisdiction | Plan Name | Date Adopted | Excerpts/Details of Document | Effect? |
|---------------------|-----------------------------|--------------|--|---------|
| Charles City County | Comprehensive Land Use Plan | May 12, 1998 | <p><i>Goal 1: Overall Development</i> To permit orderly, well-planned development to meet the physical and economic needs while retaining a majority of the County's agricultural and forestall resources, open space and communities.</p> <p>Objective 6: Establish design requirements that lessen the impact of new development on existing land uses, the environment and the natural beauty of the County.</p> <p><i>Goal 5: Industrial Development</i> Objective 7: Provide opportunities for water dependent industrial development and activities based on existing and anticipated needs and sensitive environmental resources.</p> <p><i>Goal 8: Environmental Resources Management</i> To preserve and protect the natural environment while permitting development to occur in a manner consistent with the capacity of the land to handle development.</p> <p>Objective 2: Promote development in and adjacent to flood plains, wetlands, steep slopes and other sensitive areas that protects the environment and water quality, and allows for the development of water dependent uses.</p> <p>Primary strategy: Assure that environmentally sensitive areas are protected from inappropriate development and, where necessary, left undeveloped.</p> <p>Actions and policies: Locate intensive development away from...environmentally sensitive areas...</p> | Neutral |

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| Jurisdiction | Plan Name | Date Adopted | Excerpts/Details of Document | Effect? |
|----------------------------|--------------------------|--|---|---------|
| | | | <p>Second strategy: Assure that where development does take place, it is done in a way that is compatible with the environmental capabilities of the site and that potential on-site and off-site impacts are considered.</p> <p>Actions and policies: Require strict compliance with the County's Erosion and Sediment Control Ordinance, Chesapeake Bay Ordinance, Flood plains Ordinance and Wetlands Ordinance as a means to minimize the impact of development. Encourage the use of nonstructural methods of erosion and sedimentation control and storm water management where possible. Develop a county wide stormwater management plan, as financial resources allow, that addresses specifically those areas of the County programmed for intensive industrial, commercial or residential development.</p> <p>3rd strategy, policies and actions: Require and proposed development that will locate on a river or stream shore to demonstrate the necessity of locating on a shoreline and provide an analysis of potential negative impacts on the environment and water quality and actions that will be taken to mitigate these potential impacts. Promote water conservation through education, as resources allow.</p> | |
| Charles City County | Zoning Ordinance (Draft) | September 2004 [Previously adopted September 28, 1953 and re- | <p>The purpose of this Zoning Ordinance is to promote the health, safety and general welfare of the public. To this end, this Ordinance is designed to:</p> <ol style="list-style-type: none"> 1. Provide for adequate light, air, convenience of access, and safety from fire, flood, crime and other dangers; 4. Facilitate the provision of adequate police and fire | Neutral |

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| | | adopted in 1980] | protection, disaster evacuation, civil defense, transportation, water, sewerage, flood protection, schools, parks, forests, playgrounds, recreational facilities, airports and other public requirements; 6. Protect against one or more of the following: overcrowding of land, undue density of population in relation to the community facilities existing or available, obstruction of light and air, danger and congestion in travel and transportation, or loss of life, health, or property from fire, flood, panic or other dangers. | |
| City of Richmond | City of Richmond Master Plan 2000-2020 | 2001 | <p><i>Natural Resources Goal</i></p> <ul style="list-style-type: none"> ❖ Environmentally sensitive lands will be protected from harmful and inappropriate land uses. <p><i>Key Strategies</i></p> <ul style="list-style-type: none"> ❖ Richmond is essentially a built-out city with limited vacant and developable land. <p><i>Natural Resources</i></p> <ul style="list-style-type: none"> ❖ There are approximately 24 miles of James River waterfront within the City, most of which remains in its natural state. Development along the River is confined to areas within Downtown and portions of the western bank, south to the City limits. [James River Park] ❖ Prevent development in flood plains that would result in environmental degradation or significant changes in the hydraulic condition of the watercourse. ❖ Continue to enforce those elements of the City's zoning, subdivision, floodplain and erosion and sediment control ordinances that directly affect its ability to comply with | Positive |

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|-------------------------|----------------------------------|------------------|--|--|
| | | | <p>the Chesapeake Bay Preservation Act.</p> <ul style="list-style-type: none"> ❖ Urban forests slow and absorb stormwater, reducing flooding and stream degradation. <p><i>Public Facilities and Services</i></p> <ul style="list-style-type: none"> ❖ Continue to reduce the amount of overflow of storm water and sewage into the James River through improvements to the conveyance system and sewage treatment facilities. | |
| City of Richmond | City of Richmond's Downtown Plan | October 13, 1997 | <p><i>Downtown Goals</i></p> <ul style="list-style-type: none"> ❖ Open Space. Increase the amount and quality of public open space for the recreational and economic benefit of Downtown residents, workers, and visitors. ❖ Historic Resources. Facilitate the preservation, rehabilitation and adaptive reuse of the valuable Downtown architectural and urban heritage. <p><i>Significant Recommendations</i></p> <p>3. CREATE MORE OPEN SPACE. If Downtown is to attract more residents, visitors and workers, adequate open spaces need to be provided as a balance to the dense urban environment and to direct activity and provide focal points. The Canal and Riverfront Development project, which is already underway, will provide significant new open space to help achieve this objective. It will also induce substantial adjacent private sector investment.</p> <p>4. PROMOTE MIXED-USE AND RESIDENTIAL USES. Residential use should be permitted throughout most of</p> | Neutral – may promote development in flood-prone areas |

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| Jurisdiction | Plan Name | Date Adopted | Excerpts/Details of Document | Effect? |
|------------------|----------------------|--------------|--|----------|
| | | | <p>Downtown as a means to complement other uses and generate greater activity. Monroe Ward and Shockoe Bottom have particular potential as sizable Downtown residential neighborhoods that offer a mixed-use environment unique to the region. Development regulations and financial incentives should be designed to encourage multiple uses within structures and within city blocks. Design guidelines should be established to promote the continued use of existing buildings and ensure infill development will be compatible in scale and character with surrounding structures.</p> <p>8. DEVELOP A FIXED-ROUTE DOWNTOWN CIRCULATOR CONNECTING MAJOR ACTIVITY AREAS. The distances and grade changes between major visitor attractions and other major Downtown destinations require a predictable, user-friendly public transit linkage. Of particular importance is the need to interconnect the City Center and convention area, the canal corridor, Shockoe Bottom and Shockoe Slip. An at-grade, light rail transit system using steel wheel electric trolley technology is proposed to provide this linkage. Ultimately, the system should be extended throughout the Downtown area. Such a system will enhance economic development opportunities and provide an attractive alternative to use of the automobile.</p> | |
| City of Richmond | Floodplain Ordinance | | <i>Chapter 50 FLOODPLAIN MANAGEMENT, EROSION AND SEDIMENT CONTROL, AND DRAINAGE</i> | Positive |

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| | | | <p><i>GENERALLY*</i></p> <ul style="list-style-type: none"> ❖ Applies to areas of the city subject to inundation by waters of the 100-year flood ❖ Designates floodway districts, flood fringe districts, and approximate floodplain districts. ❖ No development or land disturbing activity within a designated floodplain district shall be undertaken until after issuance of a building permit and/or land disturbing activity permit ❖ No development shall be permitted within any floodplain district except in strict compliance with the applicable sections of the Virginia Uniform Statewide Building Code ❖ Includes Chesapeake Bay provision ❖ Provision of vehicular access. No new residential construction, with start of construction on or after December 9, 1991, shall be permitted without the provision of adequate vehicular access to the site at all times prior to and during the 100-year flood. <p><i>Sec. 50-92. Floodway districts.</i></p> <ul style="list-style-type: none"> ❖ Increase in flood levels. No development or land disturbing activity shall be permitted within a floodway district that will cause any increase in flood levels during the 100-year flood. ❖ Placement of manufactured homes. The placement of any manufactured home shall not be permitted within | |

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| | | | <p>designated floodway districts.</p> <p>❖ Sets design criteria for utilities and facilities</p> <p><i>Sec. 50-94. Subdivision requirements.</i> Any proposed subdivision any portion of which lies within a floodplain district:</p> <p>(1) The 100-year floodplain shall be delineated on tentative and final subdivision plats.</p> <p>(2) Residential building lots shall be provided with adequate buildable area outside of the 100-year floodplain.</p> <p>(3) The design criteria for utilities and facilities set forth in this article shall be met.</p> <p><i>Sec. 50-96. Manufactured homes and recreational vehicles.</i> (a) Manufactured homes. Manufactured homes that are placed or substantially improved on site shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and shall be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.</p> <p><i>Sec. 50-97. New construction and substantial improvements.</i> ❖ All substantial improvements to existing structures or new construction within any floodplain district shall conform to the applicable sections of the uniform</p> | |

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| | | | <p>statewide building code for construction in a floodplain district.</p> <ul style="list-style-type: none"> ❖ Sets criteria for variance requests. ❖ Procedures for building permits and land disturbing activities. | |
| Goochland County | Capital Improvements Program 2005-2009 | April 6, 2004 | <p>The benefits of viable capital improvement programming include the following:</p> <ul style="list-style-type: none"> ❖ Assists in implementing the County's Comprehensive and Area Plans and related policies; ❖ Focuses attention on community goals and objectives. ❖ Does not address hazard mitigation related projects | Neutral |
| Goochland County | Goochland 2023: The Comprehensive Plan for Goochland County, Virginia | March 4, 2003 | <p><i>3.0 Land Use</i></p> <p>Residential Land Use Principles</p> <ul style="list-style-type: none"> ❖ Residential developments should be designed to promote the health, safety and welfare of the inhabitants -- they should be blight free, attractive and contain a variety of compatible housing types. <p>Rural Enhancement District</p> <ul style="list-style-type: none"> ❖ Natural Resource Areas are intended to protect natural environmental resources such as floodplains, steep slopes and wetlands. Most of the land within these areas is intended for little or no additional development, other than passive recreation, agriculture, forestry and other very low-intensity uses. <p>Goal 3.1: General - Promote a future land use pattern that</p> | Positive |

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| | | | <p>reinforces the objectives of the Comprehensive Plan...</p> <p>Objective 3.1.2: Protect sensitive areas from new development.</p> <p>Strategy 3.1.2a: Adopt a Map of Potential Conservation Lands that delineates sensitive environmental features for the entire county. These features include prime farmland (USDA definition), steep slopes (>25%), moderate slopes (15%-25%), and Floodprone lands (>50% chance of annual flooding). Development proposals should be assessed using this map to determine the extent of impact on the environment.</p> <p>Strategy 3.1.2i: Develop strategies and incentives to permanently preserve from development twenty (20) percent of Goochland County's land area by 2010. This strategy mirror's the Commonwealth of Virginia's commitment to do the same for Virginia's portion of the Chesapeake Bay watershed.</p> <p>Objective 3.1.3: Coordinate county codes, ordinances, and policies with land use planning.</p> <p>Goal 3.2: Residential Development – Retain the rural character of the county outside villages and designated growth centers...</p> <p>Objective 3.2.1: Guide major growth towards villages and designated growth centers.</p> | |

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| | | | <p>Goal 3.6: Guide growth in each of the eight (8) established villages and the designated growth areas to create healthy, vibrant communities...</p> <p>Objective 3.6.4: Direct growth patterns in the Courthouse Village so that it develops as a mixed-use commercial/residential community in central Goochland.</p> <p>Strategy 3.6.4d: Provide community recreation opportunities...An additional park should be considered for access to the James River. Consider an unimproved piece of land in the floodplain just west of Rt. 522 that could be used as river access for non-motorized boating and passive recreation (picnic shelters, etc).</p> <p><i>5.0 Utilities</i></p> <p>Goal 5.1: To provide for more efficient utilization of land resources in utility extension.</p> <p>Objective 5.1.3: New distribution lines should be placed underground.</p> <p>Strategy 5.1.3a: Enforcement of the County Subdivision Ordinance requiring new distribution lines to be placed underground.</p> <p><i>8.0 Community Facilities</i></p> <p>Goal 8.1: Provide for the welfare of all citizens of Goochland County through provision of adequate</p> | |

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| | | | <p>community facilities and services...</p> <p>Objective 8.1.5: Promote the general welfare by considering negative environmental impacts when planning community facilities</p> <p>Strategy 8.1.5a: Choose sites for facilities on the basis of acceptable topography, soils, and other physical traits, as well as on proximity to population centers and other factors, including traffic patterns and volume.</p> <p>❖ Implementation tools include zoning, subdivision regulations, capital improvements programming, building and housing codes, and preferential tax assessments.</p> | |
| Goochland County | Zoning Ordinance | | <p>ARTICLE 17. FLOOD HAZARD, DISTRICT F-1 (FLOODPLAIN DISTRICT)*</p> <p>❖ Applies to all lands within the jurisdiction of Goochland County and identified as being in the 100-year floodplain</p> <p>❖ Acts as an overlay district; must comply with USBC</p> <p>❖ All uses, activities and development occurring within any floodplain district shall be undertaken only upon the issuance of a zoning permit.</p> <p>❖ Manufactured homes are prohibited in the F-1 zoning district.</p> <p><i>Permitted uses:</i></p> <ul style="list-style-type: none"> • Agricultural uses, such as general farming, pasture, | Positive |

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| | | | <p>grazing, outdoor plant nurseries, horticulture, truck farming, forestry, sod farming, and wild crop harvesting.</p> <ul style="list-style-type: none"> • Accessory residential uses, such as yard areas, gardens, play areas, and previous loading areas. • Game farm, fish hatchery (excluding rearing structures), hunting and fishing reserves, boat landing. • Hunting, fishing. • Wildlife preserve, conservation area, woodland preserve, arboretum. • Outlet installation for sewage treatment plant, sealed public and private water supply well. • Public utility distribution facilities. • Retaining wall, channel improvement, flood retention dam and levee, culvert and bridge (approved by Department of Highways, Commonwealth of Virginia). • On-premises signs constructed in accordance with Article 19 of this appendix and as permitted in the underlying zoning district. (Ord. of 3-21-95(2)) <p><i>Conditional uses and structures</i></p> <ul style="list-style-type: none"> • Park, playground, day camp, picnic ground, golf course, golf driving range, miniature golf course, yacht club. • Carnival, circus, fair and any similar transient amusement • Paved off-street parking or loading and unloading area related to a use in an adjoining district. • Sand and gravel pits, quarries, soil removal, mining operations (excavating and equipment used for the | |

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| | | | <p>production and transportation of materials shall be confined to an area of at least one thousand (1,000) feet from the nearest occupied dwelling).</p> <ul style="list-style-type: none"> • Gas transmission line. • Public utility transmission line (including liquid and natural gas), transmission tower, pipe, meter, railroad. • Roadside stand for the sale of fish bait and agricultural and horticultural products produced on the premises. • Front, side and rear yard of uses permitted in an adjoining district when expressly permitted by this article and other ordinances of the county. • Commercial campgrounds. • Pulpwood receiving and storage yard, wood shipping scales, scalehouses, pumping stations and loading docks • Structures customarily accessory and clearly incidental and subordinate to uses listed previously or permitted by-right • Public and commercial swimming pool. • Office quarters housed in a temporary structure such as a mobile home or trailer which may be readily towed or otherwise removed. • Commercial and industrial structures and uses, including warehousing <p>❖ Establishes design criteria for utilities and facilities</p> <p><i>Section 14. Area regulations.</i></p> <p>❖ The minimum lot area for each permitted use shall be</p> | |

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| | | | <p>eight (8) acres. Maximum lot coverage by all structures shall not exceed five (5) percent of total tract area.</p> <p>❖ Sets criteria for special exceptions and variance requests.</p> | |
| Hanover County | Hanover County Comprehensive Plan - Vision 2022 | June 2003 | <p><i>Goal 6: To protect natural and cultural resources while providing for adequate areas to accommodate planned growth.</i></p> <p><u>Objective 2:</u> Evaluate the benefits of preserving productive agricultural and forestal land for such use as watershed protection, recreation, floodplains, scenic natural beauty and protection of historical resources. Protect the County's natural features from development, such as prime agricultural soils, excessively steep slopes, flood prone areas, and major stream valleys with unusual and sensitive ecologies.</p> <p>THE MEANS</p> <p>To continue to effectively combat sprawl, certain design and development criteria should be used when considering development proposals. These criteria are divided into categories:</p> <p>4. Open Space. Open space preservation is an important component of planning in both the Rural Planning Area and the Suburban Service Area. Planning for open space should be directed primarily to:</p> <p style="padding-left: 40px;">C. Preservation, both immediate and long-range, of the floodplains of the County's streams and rivers.</p> <p>THE FUTURE</p> | Positive |

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| | | | <p>7. Non-Agricultural Development. The only non-agricultural development that would be permitted in the Rural Land Use Area would be:</p> <p>A. Individual Homes.</p> <p>2. A request for rezoning to the RC, Rural Conservation District, will be considered in compliance with the Comprehensive Plan if the following criteria are met:</p> <p>a. Protection and preservation of all floodplains, wetlands, and steep slopes from clearing, grading, filling, or construction (except as may be approved by the county for essential infrastructure or active or passive recreation amenities).</p> | |
| Hanover County | Floodplain Ordinance | 1/27/1993 | <p>❖ All uses, activities, and development occurring within the floodplain shall be undertaken only upon the issuance of a permit and only in strict compliance with the provisions of this article and all other applicable codes and ordinances (e.g., the Virginia Uniform Statewide Building Code and the County of Hanover Subdivision Regulations).</p> <p>❖ <i>Manufactured homes.</i> Manufactured homes to be placed or substantially improved on sites within a floodplain area shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and is securely anchored to an adequately anchored foundation system to resist flotation collapse and lateral movement.</p> | Positive |

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| | | | <ul style="list-style-type: none"> ❖ Sets criteria for exceptions including for historic structures. ❖ Sets design criteria for utilities and public facilities. | |
| Henrico County | 2010 Land Use Plan | | <ul style="list-style-type: none"> ❖ <i>General Goals</i> – To promote the protection of natural resources by respecting the physical limitations of the land. To promote the health, safety, morals, order, convenience, prosperity, and general welfare of all residents. ❖ <i>General Objectives</i> – Promote development of vacant property to maximize use of existing and programmed community facilities, minimize public service costs and reduce the impact on the environment. Promote well planned controlled density developments which minimize public facility and service costs, preserve open space and environmentally critical areas, and utilize the best features of the natural environment. ❖ <i>Residential Goals</i> – To address public safety through environmental design and enhanced public awareness of crime and crime prevention techniques. ❖ <i>Residential Objectives</i> – Discourage development in area where the land's physical limitations may threaten the safety, health, and welfare of residents. ❖ <i>Residential Policies</i> – Recommend the rezoning of flood plain areas to Conservation (C1) during rezoning. Encourage residential growth in those areas where the physical conditions are conducive | Positive |

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| | | | <p>to development, i.e., soils, drainage and topography.</p> <ul style="list-style-type: none"> ❖ <i>Economic Development Goals</i> – To ensure minimal adverse environmental and fiscal impacts of development. ❖ <i>Environmental Goals</i> – To promote environmental management as an integral part of the comprehensive planning process. ❖ <i>Environmental Objectives</i> – Recommend land uses which respect the physical resources while providing adequate areas to accommodate growth. Regulate and manage development to minimize disruptions to life and property resulting from erosion and flooding. ❖ <i>Environmental Policies</i> – Manage the development of flood prone and wetlands areas through ordinances such as erosion and sediment control, zoning, subdivision, and other regulations. Delineate through on-site assessment, survey and map environmentally sensitive lands such as floodplains...steep slopes...and natural habitat areas which should be protected from disruption. Require conspicuous statements on all subdivision plats to alert prospective purchasers of pre-existing conditions which may be hazardous or affect the use and enjoyment of the property (e.g., ...flood plains...). Encourage owners of | |

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| | | | <p>property located within the 100 year flood plain to seek C-1 Conservation District zoning in order to protect these environmentally sensitive areas and to minimize stormwater control problems.</p> <p>❖ Implementation tools: PUD zoning (allows greater density) and overlay zoning</p> | |
| Henrico County | Consolidated Plan (for CDBG and HOME) | Oct. 2003 | <p><i>Housing Priorities</i></p> <p>❖ Priorities for housing include residential rehabilitation, support for assistance for elderly tenants, Sec. 8 vouchers for special populations, weatherization, use of state and local funds for the mentally disabled and group homes for the mentally disabled.</p> <p><i>Non-Housing Community Development Priorities</i></p> <p>❖ Priorities include flood drain improvements</p> <p><i>Description of Key Projects</i></p> <p>❖ Priority #1: Provide \$120,000 from CDBG and \$360,000 in HOME funds for the rehabilitation of homes owned by very low or low income elderly residents of the County.</p> | Positive |
| Henrico County | County Code | | <p><i>Sec. 24-106.1. Development and land disturbing activities within the 100-year floodplain.</i></p> <p>❖ No developer may commence any development within a base flood hazard area without first obtaining a permit from the county engineer</p> <p>❖ If new buildings or structures are to be included in the</p> | Positive |

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| | | | <p>development, the elevation of the lowest floor of such building or structure (including basement) shall be a minimum of one foot above the base flood elevation</p> <ul style="list-style-type: none"> ❖ If substantial improvements to existing buildings or structures are to be included in the development, the elevation of the lowest floor (including basement) of such improvements shall be a minimum of one foot above the base flood elevation. ❖ Repair, replacement or reconstruction of damaged or destroyed buildings. No repair, replacement or reconstruction of a damaged or destroyed building or structure may occur without complying with the provisions of this section which are applicable to new buildings or structures. ❖ Sets variance criteria. <p><i>ARTICLE XXI. HEIGHT, LOT, YARD AND BUILDING REGULATIONS</i> <i>Sec. 24-95. Additional requirements, exceptions and modifications.</i></p> <ul style="list-style-type: none"> ❖ Provides special yard and additional regulations for any lot used for dwelling purposes and having lot area in a base flood hazard area ❖ No new dwelling or manufactured home may be located within the base flood hazard area ❖ No new dwelling or manufactured home may be | |

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| | | | <p>located any closer to a base flood hazard area than the minimum side yard width otherwise required for the lot or ten feet, whichever is greater in horizontal distance.</p> <ul style="list-style-type: none"> ❖ The elevation of the lowest floor, for any new dwelling or manufactured home, when located nearer to the base flood hazard area than the minimum rear yard depth otherwise required for the lot, shall be one foot above the base flood elevation. | |
| New Kent County | Floodplain Ordinance | | <p>ARTICLE II. GENERAL AREA, FRONTAGE, YARDS, HEIGHT, SETBACK, PERFORMANCE REQUIREMENTS AND STANDARDS</p> <p>Sec. 98-57. Floodplain.</p> <ul style="list-style-type: none"> ❖ Shall apply to all lands within the jurisdiction of the county and identified as being in the 100-year floodplain ❖ Overlay district; comply with USBC ❖ All uses, activities and development occurring within any floodplain district shall be undertaken only upon the issuance of a zoning permit <p><i>Mobile homes.</i></p> <p>(1) Mobile homes that are placed or substantially improved within zones A-1 and MHP on the county's FIRM, on sites:</p> <ol style="list-style-type: none"> a. Outside of a mobile home park or subdivision; b. In a new mobile home park or subdivision; | Positive |

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| | | | <p>c. In an expansion to an existing mobile home or subdivision; or</p> <p>d. In an existing mobile home park or subdivision on which a mobile home has incurred substantial damage as the result of a flood, must be elevated on a permanent foundation such that the lowest floor of the mobile home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist floatation, collapse and lateral movement.</p> <p>(2) Mobile homes to be placed or substantially improved on sites in an existing mobile home park or subdivision within zones A-1 and MHP on the county's FIRM that are not subject to the provisions of subsection (e)(1) of this section must be elevated so that either:</p> <p>a. The lowest floor of the mobile home is at or above the base flood elevation; or</p> <p>b. The mobile home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and are securely anchored to an adequately anchored foundation system to resist floatation, collapse and lateral movement.</p> <p>❖ Sets design criteria for utilities and facilities</p> <p>Sec. 98-61. Existing structures in floodplain districts.</p> <p>❖ A structure or use of a structure or premises which lawfully existed before the enactment of this article,</p> | |

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| | | | <p>but which is not in conformity with this article, may be continued subject to the following conditions:</p> <p>(1) Any modification, alteration, repair, reconstruction or improvement of any kind to a structure and/or use located in any floodplain areas to an extent or amount of less than 50 percent of its market value, shall be elevated and/or floodproofed to the greatest extent possible.</p> <p>(2) The modification, alteration, repair, reconstruction or improvement of any kind to a structure and/or use, regardless of its location in a floodplain district, to an extent or amount of 50 percent or more of its market value shall be undertaken only in full compliance with the provisions of the Virginia Uniform Statewide Building Code.</p> | |
| New Kent County | New Kent Comprehensive Plan – New Kent Vision 2020 | August 4, 2003 | <ul style="list-style-type: none"> ❖ Overarching goal: Protect the natural environment. ❖ Scenic highway corridors, villages, hamlets, and crossroads giving way to subdivisions and strip residential and commercial development – comprehensive plan to de-emphasize this growth pattern ❖ Areas with slopes in excess of 25 percent are found throughout the County. These slopes, in addition to an extensive amount of tidal and non-tidal wetlands, floodplains, Chesapeake Bay Protection areas and endangered species provide a formidable challenge to the County to protect sensitive areas from the potentially harmful effects of development. | Positive |

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| | | | <p><i>Resource Protection</i></p> <p>Goal 1: Conserve, protect and preserve the quality of the County's air, water, soil, wildlife habitat and scenic views through responsible stewardship of the land.</p> <p>Objective D: Develop practical and realistic zoning and regulatory controls that protect the natural environment while recognizing and considering private property rights.</p> <ul style="list-style-type: none"> ○ Strategy 5. Adopt and maintain floodplain protection measures in appropriate County ordinances and development policies. <p>Objective F: Provide incentives for conservation land use planning.</p> <ul style="list-style-type: none"> ○ Strategy 1. Adopt clustering and open space development techniques as an option for residential developments and provide incentives for their use. ○ Strategy 3. Promote the use of conservation easements on private property. ○ Strategy 4. Seek enabling legislation to allow for public purchase and private trading of development rights. ○ Strategy 7. Continue to improve the County's Geographic Information system (GIS) to identify and delineate sensitive environmental areas. | |

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| | | | <p><i>Public Utilities</i></p> <p>Goal 2: Explore creative and innovative approaches to the provision of public utilities.</p> <p>Objective A: Compare local and regional approaches to the provision of public utilities.</p> <ul style="list-style-type: none"> ○ Strategy 5. Work with the Virginia Department of Forestry to install dry hydrants in portions of the County where water services do not exist. <p><i>Priority Implementation Strategies</i></p> <p>Provide for the purchase and/or dedication of conservation, agricultural and scenic easements in order to protect the County's natural environment, productive lands and scenic vistas.</p> | |
| Powhatan County | Comprehensive Plan | January 12, 1998 | <p><i>Goals for the County's Future</i></p> <p>Overall Growth Management Goals</p> <ul style="list-style-type: none"> ❖ Maintain the rural character of the County as defined by existing features such as the feeling of personal safety and privacy, quiet, natural habitats, forested land, rivers, streams and creeks, uncrowded conditions and a low cost of living. ❖ Locate new public facilities and services so as to promote a compact development pattern that allows services to be provided in a cost-effective manner. <p><i>Land Use Policies for the Rural Preservation Policy Area</i></p> <p>a. Residential Land Use Policies</p> <ul style="list-style-type: none"> ❖ Conservation easements – require conservation | Neutral |

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| | | | <p>easements on residual parcels greater than 20 acres at the time of subdivision to stabilize the character and intensity of the property....will prohibit further subdivision or substantial non-farm development...for a minimum of 40 years, and may be in perpetuity.</p> <p>f. Zoning Districts</p> <p>❖ Flood Plain District is appropriate for use in this area.</p> <p><i>Land Use Policies for the Village Preservation Areas</i></p> <p>f. Zoning Districts</p> <p>❖ Flood Plain District is appropriate for use in this area.</p> <p><i>Land Use Policies for the Village Service Areas</i></p> <p>f. Zoning Districts</p> <p>❖ Flood Plain District is appropriate for use in this area.</p> <p><i>Land Use Policies for the Business Service Areas</i></p> <p>f. Zoning Districts</p> <p>❖ Flood Plain District is appropriate for use in this area.</p> <p><i>Countywide Planning Policies and Actions</i></p> <p>Agricultural, Forest and Natural Resources – Floodplains, Wetlands, and Surface Water Resources</p> <p>Policies for Floodplains, Wetlands and Surface Water Resources</p> <p>❖ The County will: 1) encourage establishment of vegetative buffers along all active creeks and streams; 2) maintain natural drainage courses wherever possible during the design and construction process for land development, 3) maintain existing topography and vegetation wherever possible during the design and</p> | |

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| | | | <p>construction process for land development, 4) encourage the establishment and preservation of 100 foot stream buffers along streams which drain areas of one square mile or greater, and 5) encourage the use of Best Management Practices (BMPs) for all construction and agricultural activities.</p> <p>Implementation Actions for Floodplains, Wetlands and Surface Water Resources</p> <ul style="list-style-type: none"> ❖ The County will: 1) review the County's land development regulations to ensure that the policies of this plan for floodplains, wetlands and surface waters are adequately supported and implemented through those ordinances <p>Citizen Involvement in the Planning Process</p> <ul style="list-style-type: none"> ❖ Policy: Foster and support opportunities for all citizens to become more knowledgeable about land use, environmental, transportation and land development issues, techniques and legal aspects. | |
| Powhatan County | Subdivision Regulations | | <p><i>4.2 Preliminary Plats – 4.2-2.12.4 –Other Conditions - A 50-foot natural vegetative buffer shall be maintained along all intermittent streams. A 100-foot natural vegetative buffer shall be maintained along all perennial streams.</i></p> <ul style="list-style-type: none"> ❖ Floodplain shall be shown on final plat. <p><i>6.6 Flooding of Subdivisions Along Watercourses – Land within any flood plain district will not be included in minimum lot area requirements and will not be raised by fill.</i></p> | Positive |

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| | | | <i>6.6.-1.0</i> – All residences constructed on lots within a 100-year HUD designated flood plain area shall maintain a ten (10) foot horizontal and one (1) foot vertical separation from the flood plain. | |
| Powhatan County | Zoning Ordinance | November 18, 1996 | <i>Article 19 – Flood Plain District (FP)</i> ❖ Establishes overlay district. Intended to comply with NFIP requirements. ❖ Permitted uses: <ul style="list-style-type: none"> ○ Agricultural uses ○ Hunting, fishing and wildlife preserves, and boat landings ○ Railroads, streets, bridges, and public utility transmission and distribution lines ○ Public parks and playgrounds, sports areas, nature areas and outdoor private clubs ○ No principal structures may be erected in this District, however, structures incidental to the permitted uses are permitted ❖ All development in flood plain district requires permit. ❖ Sets design criteria for utilities and facilities. ❖ Sets criteria for existing structures regarding expansion and reconstruction. | Positive |
| Town of Ashland | Comprehensive Plan | May 14, 2004 (verify year) | <i>Natural Resources</i> ❖ Resource Management Area – includes floodplains | Neutral |

APPENDIX H – MITIGATION ACTIVITIES⁶

Mitigation activities fall into six general categories. These categories are explained in the next section. The second and third sections provide more detail on common mitigation activities.

General Categories

Prevention

Preventative activities are intended to keep hazard problems from getting worse. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning
- Open space preservation
- Floodplain regulations
- Storm water management
- Drainage system maintenance
- Capital improvements programming
- Shoreline / riverine setbacks

Property Protection

Property protection measures protect new or existing structures by modifying the building to withstand hazardous events, or removing structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (i.e., windproofing, floodproofing, seismic design standards, etc.)
- Enhanced building codes

⁶ This information is based, in part, on the City of Chesapeake (VA) Hazard Mitigation Plan. Portions of this document also were drawn from the *Tools and Techniques: An Encyclopedia of Strategies to Mitigate the Impact of Natural Hazards* developed by the State of North Carolina in 2002.

- Insurance
- Safe rooms

Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their mitigation functions. Such areas include floodplains, wetlands, and dunes. Parks, recreation, or conservation agencies, and organizations often implement these measures. Examples include:

- Floodplain protection
- Riparian buffers
- Fire-resistant landscaping
- Fuel breaks
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Channel modification
- Diversions / detention / retention
- Levees / dikes / floodwalls
- Reservoirs
- Storm sewers
- Utility protection/upgrades
- Wind retrofitting

Emergency Services

Although not typically considered a “mitigation technique,” emergency service measures do minimize the impact of a hazard event on people and property. These

commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Sandbagging for flood protection
- Installing shutters for wind protection

Public Information and Awareness

Public information and awareness activities are used to advise residents, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children education
- Hazard expositions
- Websites

General Multi-Hazard Mitigation Alternatives

The mitigation alternatives selected should be linked to the Planning District's goals and objectives, and must address each jurisdiction's hazard risks and vulnerability outlined in the plan's Hazard Identification and Risk Assessment. The following potential mitigation activities are not specific to one hazard but can benefit a community's overall hazard reduction efforts.

Comprehensive Plans

Comprehensive plans address how and where a community should grow by guiding the rate, intensity, form, and quality of physical development. These plans address land use, economic development, transportation, recreation, environmental protection, the provision of infrastructure, and other municipal functions. Comprehensive plans help to guide other local measures such as capital improvement

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programs, zoning ordinances, subdivision ordinances and other community policies and programs. By including natural hazard considerations into the plan, mitigation becomes integrated with community functions and could therefore be an institutionalized part of a jurisdiction's planning efforts.

Density and development patterns should reflect the Planning District communities' ability to protect their jurisdictions, the environment, and the ability to evacuate the area. Development management tools should be incorporated into the local policies that address the location, density, and use of land, with a particular emphasis on development within high-risk areas. Efforts should be made to keep people and property out of high-hazard areas whenever possible. Particularly hazardous areas could be used for recreational uses, open space, or wildlife refuges.

Zoning

Zoning is by far the most common land use control technique used by local governments. While a useful tool for regulating and restricting undesirable land uses, zoning has a somewhat more limited benefit when it comes to mitigation. Zoning is most effective on new development rather than existing development, which does little to address the pre-existing development in hazardous areas. Communities with a large amount of undeveloped land will benefit much more than older, more established communities.

A community might create an overlay zone for high-hazard districts that establishes mitigation requirements for development in those districts. Overlays are also useful for periods of reconstruction. A recovery overlay zone would include temporary planning regulations that might strictly limit reconstruction in the hazard area or could require any new development to include hazard mitigation techniques. The overlay zone would remain transparent until it was triggered by a disaster event.

Even for new development, the issuance of variances, special use permits, rezoning, and the failure to enforce existing codes, however, will weaken zoning's ability to prevent certain types of building practices.

Capital Improvement Plans/Critical Facility Placement

Capital improvement plans typically provide for the future and ongoing provision of public facilities and infrastructure. These plans can be vital tools in keeping new development out of high-hazard areas by limiting the availability of public infrastructure. Public facilities can often be relocated to less hazardous areas in the

aftermath of a disaster. Public utilities also can be relocated, or they can be upgraded or floodproofed. Power and telephone lines can be buried underground.

In order to maximize the gravity flow area of wastewater treatment plants, the facilities are often located at the lowest elevation in the community. If this point lies within a floodplain for example, consideration may be given to relocating or floodproofing such facilities. New locations for critical facilities should not be in hazard-prone areas, or in areas where their function may be impaired by a given hazard event (i.e., where water can flood the access roads). Critical facilities should be designed and/or retrofitted in order to remain functional and safe before, during, and after a hazard event.

Building Codes

Building codes regulate the design, construction, and maintenance of construction within most communities. These regulations prescribe standards and requirements for occupancy, maintenance, operation, construction, use, and appearance of buildings. Building codes are an effective way to ensure that new and extensive re-development projects are built to resist natural hazards. In Virginia, communities are required by law to adopt and enforce the Uniform Statewide Building Code, which has provisions for wind, water, and seismicity.

Public Outreach and Education Programs

Educating the public about what actions they can take to protect themselves and their property from the effects of natural hazards can be an effective means for reducing losses. These types of programs could target public officials, citizens, businesses, or the local construction trade. The program could cover preparedness, recovery, mitigation, and general hazard awareness information. The information could be presented in a variety of ways, from workshops, brochures, advertisements, or local media. Potential outreach and education topics include:

- Code awareness training
- Sheltering and evacuation
- Flood insurance
- School information (primary, secondary, colleges, and universities)
- New homeowner/resident information
- Emergency preparedness for families, businesses, and tourists
- Driver safety in disasters

- Hazard mitigation for homeowners (including manufactured homes and trailers), renters, and businesses
- Special needs populations

Neighborhood Access

Provide additional means of access into single-entry neighborhoods, in order to prevent residents from becoming trapped in a hazardous area during a wildfire or flood. It may be more cost-effective to require this of new developments.

Vegetative Maintenance

Vegetative maintenance is the pruning and maintenance of trees, bushes, and other vegetation that could increase threats to power lines during storms, or could act as fuels during wildfires. This could be applied in limited areas that have a significant vulnerability to these hazards, such as within utility easements or along the urban-wildland interface.

Vegetative Planting and Treatment

Vegetative planting and treatments can help to capture and filter runoff or reduce wildfire risk depending on the types of plants used. Perennial vegetation includes grass, trees, and shrubs that cover the soil, reduce water pollution, slow the rate of runoff, increase filtration, and prevent erosion. This type of land treatment includes maintaining trees, shrubberies, and the vegetative cover; terracing (i.e., a raised bank of earth with vertical sloping sides and a flat top to reduce surface runoff); stabilizing slopes; grass filter strips; contour plowing; and strip farming (i.e., the growing of crops in rows along a contour). Other potential options include vegetated swales, infiltration ditches, and permeable paving blocks.

Special Assessment Districts

Special assessment districts apply to property owners who directly benefit from a specific public improvement. These owners of both new and existing development in the district are charged a fee that is proportional to the benefits received from the improvement. There are a number of ways to apply this technique, from temporary assessments that raise revenue for a specific improvement to indefinite assessments that fund independent, special purpose governmental entities. The former could be used to fund structural projects, such as a floodwall, while the latter could be used to establish a regional floodplain management organization.

Another example might be the creation of a “special storm services” district, where funds would go toward mitigation, recovery and response activities. In other cases,

the fee could be used to pay for the upkeep of stormwater management system or as a way of providing for the future replacement of roads and utilities at the public expense. These charges may or may not have the effect of discouraging development in the assessment district. However, they do transfer some of the cost of living or doing business in a hazard-prone area to those who choose to do so.

Hazard-Specific Alternatives

The following is a list of potential mitigation measures that tend to work better when applied to a specific hazard.

Flood

Flood mitigation measures can be classified as structural or non-structural. In simple terms, structural mitigation attempts to eliminate the possibility of flooding at a particular location. Non-structural mitigation removes the potentially effected people or property from the potentially flooded area. The following is a description of potential flood mitigation measures.

Floodplain Management Ordinances

Floodplain management addresses the hazard risk of communities partially or entirely located in a floodplain. Floodplain management ordinances should restrict development that would increase flood heights and ensure that construction materials and methods used will minimize future flood damage. Provisions requiring first floor elevations to be above the base flood elevation may be appropriate for certain areas. These “freeboard” requirements compensate for the unknown factors that may increase flood levels beyond the anticipated level

Floodplain management ordinances are weakened by development pressures, a lack of suitable sites outside of the floodplain, community desires to be near the water, inability to effectively monitor floodplain management activities, or by land use planning policies that are encouraging development into floodplain areas.

Acquisition

Acquisition involves the purchasing of property in a hazardous area, which is subsequently cleared and permanently held as open space. Acquisition permanently moves people and property out of harm’s way, increases floodplain capacities, recreation areas and open space, and can help to preserve wetlands, forests, estuaries and other natural habitats. Participation in federally-funded grant programs requires voluntary participation by the owner.

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Acquisition programs can be expensive to undertake, and the property will no longer accrue taxes for the community and must be maintained, but it is by far the most effective and permanent mitigation technique. Acquisition is most effective when targeting repetitive loss structures, extremely vulnerable structures, or other high-hazard areas.

Elevation

Elevation is the raising of a structure above the Base Flood Elevation. Elevation is often the best alternative for structures that must be built or remain in flood-prone areas, and is less costly than acquisition or relocation. However, elevating a structure can increase its vulnerability to high winds and earthquakes. Some building types are either unsuitable or cost-prohibitive to elevate.

Relocation

Relocation involves the moving of a building or facility to a less hazardous area, on either the same parcel or another parcel. This measure also moves people and property out of harm's way, and is a very effective measure overall. Some building types are either unsuitable or cost-prohibitive to relocate.

Stormwater Management Plans

New development that increases the amount of impervious surfaces affects the land's ability to absorb the water and can intensify the volume of peak flow runoff. Without efficient stormwater management, runoff could cause flooding, erosion, and water quality problems. Stormwater management plans should incorporate both structural and nonstructural measures in order to be most effective.

Structural measures include retention and detention facilities that minimize the increase of runoff due to impervious surfaces and new development. Retention facilities allow stormwater to seep into the groundwater. Detention systems accumulate water during peak runoff periods that will be released at off-peak times. Nonstructural measures include establishing impervious surface limit policies and maintenance programs for existing drainage systems.

Dry Floodproofing

Dry floodproofing involves making all areas below the flood protection level watertight by strengthening walls, sealing openings, using waterproof compounds, or applying plastic sheeting on the walls. This method is not recommended for residential structures, but may work well for new construction, retrofitting, or repairing a non-residential structure. Due to pressure exerted on walls and floors by

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floodwater, dry floodproofing is effective on depths less than 2 to 3 feet. Floodproofing of basements is not recommended.

Wet Floodproofing

The opposite of dry floodproofing, wet floodproofing lets the floodwater actually enter a structure. This technique is effective on deeper flood depths, as it does not have the same potential to build up exterior pressure. Again, this method is not recommended for residential structures and may not be used for basements under new construction, substantial improvements, or substantially damaged structures.

Storm Drainage Systems

Mitigation efforts include the installation, re-routing, or increasing the capacity of storm drainage systems. Examples include the separation of storm and sanitary sewers, addition or increase in size of drainage or retention ponds, drainage easements, or creeks and streams.

Drainage Easements

Easements can be granted that enable regulated public use of privately owned land for temporary water retention and drainage areas.

Stream/Channel Maintenance

Waterways should be cleared of debris to allow for the free flow of water during a flood event. If streams or rivers are clogged with debris, damming could occur. As a result, areas upstream and adjacent to the unintended dam can receive unanticipated higher flood levels. In addition, downstream areas may be vulnerable to higher flooding if and when the dam breaks.

Structural Flood Control Measures

Water can be channeled away from people and property with structural control measures such as levees, dams, or floodwalls. These measures also may increase drainage and absorption capacities. These structural control measures also may increase Base Flood Elevations and could create a false sense of security.

Basement Backflow Prevention

Check valves, sump pumps, and backflow prevention devices in homes and buildings can be used to prevent flooding in basements from sewer backflows. This option can be done only if the infrastructure allows it.

Wind

Proper engineering and design of a structure can increase a structure's ability to withstand the lateral and uplift forces of wind. Building techniques that provide a continuous load path from the roof of the structure to the foundation are generally recommended.

Windproofing

Windproofing is the modification of the design and construction of a building to resist damages from wind events, and can help to protect the building's occupants from broken glass and debris. Windproofing involves the consideration of aerodynamics, materials, and the use of external features such as storm shutters. These modifications could be integrated into the design and construction of a new structure or applied to reinforce an existing structure.

Manufactured homes, which tend to be vulnerable to the effects of extreme wind events, can be protected by anchoring the structures to their foundations. Mobile homes could be tied down to their pads in order to prevent them from being destroyed. Public facilities, critical infrastructure, and public infrastructure (such as signage and traffic signals) should all be windproofed in vulnerable areas. However, windproofing is not a viable mitigation technique to protect against tornadoes.

Community Shelters/Safe Rooms

Community shelters and concrete safe rooms can offer protection and reduce the risk to life. Locations for these shelters or safe rooms are usually in concrete buildings such as shopping malls or schools. Communities lacking basements and other protection nearby should consider developing tornado shelters.

Burying Power Lines

Buried power lines can offer uninterrupted power during and after severe wind events and storms. Burying power lines can significantly enhance a community's ability to recover in the aftermath of a disaster. Buried power lines are typically more expensive to maintain and are more vulnerable to flooding. Encouraging back-up power resources in areas where burial is not feasible will enable the continuity of basic operations (e.g., security, refrigeration, and heat) for businesses and facilities when there is a loss of power.

APPENDIX I – FREQUENTLY USED MITIGATION TERMS AND ACRONYM LIST

Frequently Used Mitigation Terms

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| Acquisition of Hazard-Prone Structures | Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property. |
| Base Flood Elevation (BFE) | Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as a standard for the National Flood Insurance Program. |
| Benefit | Net project outcomes, usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of conducting a benefit cost analysis of proposed mitigation measures, benefits are limited to specific, measurable risk reduction factors, including a reduction in expected property losses (building, contents, and function) and protection of human life. |
| Benefit-Cost Analysis (BCA) | A systematic, quantitative method of comparing the projected benefits to projected costs of a project or policy. It is used as a measure of cost-effectiveness. |
| Capability Assessment | An assessment that provides a description and analysis of a community or state's current capacity to address the threats associated with hazards. The capability assessment attempts to identify and evaluate existing policies, regulations, programs, and practices that positively or negatively affect the community or state's vulnerability to hazards or specific threats. |
| Community Rating System (CRS) | CRS is a program that provides incentives for National Flood Insurance Program communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of these policyholders in communities are reduced. |
| Cost-Effectiveness | Cost-effectiveness is a key evaluation criterion for federal grant programs. Cost-effectiveness has several possible definitions, although for grant making purposes FEMA defines a cost-effective project as one whose long-term benefits exceed its costs. That is, a project should prevent more expected damages than it costs initially to fund the effort. This is done to ensure that limited public funds are used in the most efficient manner possible. Benefit-cost analysis is one way to illustrate that a project is cost-effective. |

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| Critical Facilities | Facilities vital to the health, safety, and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals. |
| Debris | The scattered remains of assets broken or destroyed in a hazard event. Debris transported by a wind or water hazard event can cause additional damage to other assets. |
| Disaster Mitigation Act of 2000 (DMA 2000) | DMA 2000 (Public Law 106-390) is the latest legislation to improve the planning process. Signed into law on October 30, 2000, this legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. |
| Displacement Time | The average time (in days) which the building's occupants typically must operate from a temporary location while repairs are made to the original building due to damages resulting from a hazard event. |
| Elevation of Structures | Raising structures above the base flood elevation to protect structures located in areas prone to flooding. |
| Erosion | Wearing away of the land surface by detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes. |
| Essential Facility | Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations. |
| Federal Emergency Management Agency (FEMA) | Agency created in 1979 to provide a single point of accountability for all federal activities related to disaster mitigation and emergency preparedness, response, and recovery. FEMA is now part of the Department of Homeland Security. |
| Flash Flood | A flood event occurring with little or no warning where water levels rise at an extremely fast rate. |
| Flood | A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land. |
| Flood Depth | Height of the flood water surface above the ground surface. |

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| Flood Elevation | Elevation of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level. |
| Flood Hazard Area | The area on a map shown to be inundated by a flood of a given magnitude. |
| Flood Insurance Rate Map (FIRM) | Map of a community, prepared by the Federal Emergency Management Agency that shows both the special flood hazard areas and the risk premium zones applicable to the community. |
| Flood Insurance Study (FIS) | A study that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities. |
| Flood Mitigation Assistance (FMA) Program | A program created as part of the National Flood Insurance Reform Act of 1994. FMA provides funding to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other NFIP insurable structures, with a focus on repetitive loss properties. |
| Floodplain | Any land area, including watercourse, susceptible to partial or complete inundation by water from any source. |
| Floodproofing | Actions that prevent or minimize future flood damage. Making the areas below the anticipated flood level watertight (dry floodproofing) or intentionally allowing floodwaters to enter the interior to equalize flood pressures are examples of flood-proofing (wet floodproofing). |
| Flood Zone | A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area. |
| Frequency | A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered. |
| Functional Downtime | The average time (in days) during which a function (business or service) is unable to provide its services due to a hazard event. |
| Geographic Information Systems (GIS) | A computer software application that relates physical features on the earth to a database to be used for mapping and analysis. |

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| Goals | General guidelines that explain what you want to achieve. They are usually broad policy-type statements, long term in nature, and represent global visions. |
| Hazard | A source of potential danger or adverse condition. Hazards include naturally occurring events such as floods, earthquakes, tornadoes, tsunamis, coastal storms, landslides, and wildfires that strike populated areas and has the potential to harm people or property. |
| Hazard Event | A specific occurrence of a particular type of hazard. |
| Hazard Identification | The process of identifying hazards that threaten an area. |
| Hazard Information Center | Information booth, publication kiosk, exhibit, etc. that displays information to educate the public about hazards that affect the jurisdiction and hazard mitigation activities people can undertake. |
| Hazard Mitigation | Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects. |
| Hazard Mitigation Grant Program (HMGP) | Authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster. |
| Hazard Profile | A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps. |
| Hurricane | An intense tropical cyclone, formed in the atmosphere over warm ocean seas, in which wind speeds reach 74-miles-per-hour or more and blow in large spiral around a relatively calm center or "eye". Hurricanes develop over the north Atlantic Ocean, northeast Pacific Ocean, or the south Pacific Ocean east of 160°E longitude. Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere. |
| Hydrology | The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study. |
| Infrastructure | Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment |

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| | facilities, and transportation systems such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, dry docks, piers and regional dams. |
| Landslide | Downward movement of a slope and materials under the force of gravity. |
| Loss Estimation | Forecasts of human and economic impacts and property damage from future hazard events, based on current scientific and engineering knowledge. |
| Lowest Floor | Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure. |
| Magnitude | A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard. |
| Mitigate | To cause something to become less harsh or hostile: to make less severe or painful. |
| Mitigation Actions | Activities or projects that help achieve the goals and objectives of a mitigation plan. |
| Mitigation Plan | The document that articulates results from the systematic process of identifying hazards and evaluating vulnerability, identifying goals, objectives, and actions to reduce or eliminate the effects of identified hazards, and an implementation plan for carrying out the actions. |
| National Flood Insurance Program (NFIP) | Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3. |
| National Weather Service (NWS) | Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and state entities in preparing weather and flood warning plans. |
| Nor'easter | An extra-tropical cyclone producing gale-force winds and precipitation in the form of heavy snow or rain. |
| Objectives | Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific and measurable. |
| Open Space Preservation | Preserving undeveloped areas from development through any number of methods, including low-density zoning, open space zoning, easements, or public or private acquisition. Open space |

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| | preservation is a technique that can be used to prevent flood damage in flood-prone areas, land failures on steep slopes or liquefaction-prone soils, and can enhance the natural and beneficial functions of floodplains. |
| Post-Disaster Recovery Planning | The process of planning those steps the jurisdiction will take to implement long-term reconstruction with a primary goal of mitigating its exposure to future hazards. The post-disaster recovery planning process can also involve coordination with other types of plans and agencies, but it is distinct from planning for emergency operations. |
| Probability | A statistical measure of the likelihood that a hazard event will occur. |
| Public Education and Outreach Programs | Any campaign to make the public more aware of hazard mitigation and mitigation programs, including hazard information centers, mailings, public meetings, etc. |
| Regulation | Most states have granted local jurisdictions broad regulatory powers to enable the enactment and enforcement of ordinances that deal with public health, safety, and welfare. These include building codes, building inspections, zoning, floodplain and subdivision ordinances, and growth management initiatives. |
| Recurrence Interval | The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year. |
| Relocation Out of Hazard Areas | A mitigation technique that features the process of demolishing or moving a building to a new location outside the hazard area. |
| Repetitive Loss Property | A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least \$1,000 each have been paid within any 10-year period since 1978. |
| Replacement Value | The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot, and reflects the present-day cost of labor and materials to construct a building of a particular size, type and quality. This is not the same as market value. |
| Resources | Resources include the people, materials, technologies, money, etc., required to implement strategies or processes. The costs of these resources are often included in a budget. |
| Risk | The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or |

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| | damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard. |
| Special Flood Hazard Area (SFHA) | An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with zone designations that include the letter A or V. |
| Stafford Act | The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs. |
| Stakeholders | Individuals or groups, including businesses, private organizations, and citizens, that will be affected in any way by an action or policy. |
| State Hazard Mitigation Officer (SHMO) | The representative of state government who is the primary point of contact with FEMA, other state and Federal agencies, and local units of government in the planning and implementation of pre- and post disaster mitigation activities. |
| Storm Surge | Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface. |
| Structural Retrofitting | Modifying existing buildings and infrastructure to protect them from hazards. |
| Subdivision and Development Regulations | Regulations and standards governing the division of land for development or sale. Subdivision regulations can control the configuration of parcels, set standards for developer-built infrastructure, and set standards for minimizing runoff, impervious surfaces, and sediment during development. They can be used to minimize exposure of buildings and infrastructure to hazards. |
| Tornado | A violently rotating column of air extending from a thunderstorm to the ground. |
| Tropical Cyclone | A generic term for a cyclonic, low-pressure system over tropical or subtropical waters. |
| Tropical Depression | A tropical cyclone with maximum sustained winds of less than 39 mph. |
| Tropical Storm | A tropical cyclone with maximum sustained winds greater than 39 |

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mph and less than 74 mph.

Vulnerability

Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability Assessment

The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.

Zoning Ordinance

Designation of allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

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Acronym List

BFE – Base Flood Elevation
BRV – Building Replacement Value
BZA – Board of Zoning Appeals
CBPA – Chesapeake Bay Preservation Area
CRS – Community Rating System
CRV – Contents Replacement Value
DDF – Depth Damage Function
DMA 2000 – Disaster Mitigation Act of 2000
DOF – Virginia Department of Forestry
DPW – Department of Public Works
EMI – Emergency Management Institute
FEMA – Federal Emergency Management Agency
FIA – Flood Insurance Administration
FIRM – Flood Insurance Rate Map
FIS – Flood Insurance Study
GIS – Geographical Information System
HAZMAT – Hazardous Materials
HIRA – Hazard Identification Risk Assessment
HMGP – Hazard Mitigation Grant Program
HVA – Hazard Vulnerability Assessment
IBC – International Building Code
IFPC – International Fire Protection Codes
IRC – International Residential Code
ISO – Insurance Services Office
LEPC – Local Emergency Planning Committee
LOF – Loss of Function
MAC – Mitigation Advisory Committee
MLW – Mean Low Water

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MSA – Metropolitan Statistical Area

NFIP – National Flood Insurance Program

NHC – National Hurricane Center

NOAA – National Oceanic Atmospheric Administration

NPDES – National Pollutant Discharge Elimination System

NWS – National Weather Service

PFM – Public Facilities Manual

RMA – Resource Management Area

RPA – Resource Protection Area

RRPDC – Richmond Regional Planning District Commission

SFHA's – Special Flood Hazard Areas

STAPLE/E – Social, Technical, Administrative, Political, Legal, Economic and Environmental

USDA – United States Department of Agriculture

USGS – United States Geological Survey

VDEM – Virginia Department of Emergency Management

VDEQ – Virginia Department of Environmental Quality

WDF – Wind Damage Function